

COAL AGE

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Progressive Coal Plans

BY FLOYD W. PARSONS

RAILROADS and power plants of the United States have made it a rule to burn the very best coal that they could obtain. Now that the Nation is at war, this practice must cease, and Uncle Sam's locomotives, as well as many industries, will have to use coals of a somewhat lower grade.

The reason for this necessity is the scarcity of fuel specially adapted for byproduct plants, metallurgical purposes, ship bunkering and domestic consumption. When the railroads, or other consumers, take their needed tonnage from coal particularly suited for the foregoing purposes, a crime is committed against the Nation in its hour of need.

Marine boilers give highest service when burning a low-volatile coal. Such fuel not only adds to the speed of our naval vessels and transports, but it is smokeless, and thereby less likely to attract the submarine assassins. In this grade of fuel the navy's needs are paramount, and all other consumers must come second.

Metallurgical works and coke ovens are essentially war plants today. They must have, as a rule, a high-volatile coal running very low in sulphur. Railroads are particularly fond of this grade of fuel; however, there can be no question as to who must get it. All locomotives should be furnished high-volatile coal, and it must be decently prepared; but there is no reason why the railroads should insist on having the best our mines produce. It is also necessary that gas works and retail coal yards get their proper share of those coals suited to fill these special needs, for our domestic life must go on.

This is no time, of course, to undervalue the importance of transportation. The problem is very like our food problem. We must live, but we can get along without all-wheat bread. The railroads, and many other

consumers, can get along without using coal that is sorely needed to safeguard our ships and to manufacture war supplies.

Mr. McAdoo is still indisposed. The railroad-fuel question remains unsettled. Dr. Garfield has appointed Walter A. Marsh, formerly general manager of sales for the Pittsburgh Coal Co., to the position of manager of the railway fuel division under Mr. Morrow. It will be Mr. Marsh's job to see that certain coals go where they are best suited and most needed. This is quite a step forward and should help the situation materially.

It is already certain that next winter will usher in a serious fuel situation. There is real reason to believe that the present weekly production of coal is near maximum, and if that is true, the output for the year will fall far short of estimated requirements. There can be no such thing as "business as usual" if we carry through our scheduled war program.

Among other problems Mr. Marsh will have to discover a solution for the difficulties of coal users in the Middle West. In Chicago and the territory adjacent, past winters have witnessed the consumption of much anthracite and a considerable quantity of low-volatile bituminous coal. The consumers in this Middle West region have base-burner stoves and furnaces designed to use these high-grade coals. Just how they will be able to burn Southern Illinois coal without altering present facilities is something worth knowing.

Wise people will now get what coal they can as quick as they can. They will also make the necessary changes in their homes and their plants to burn the particular grade of fuel that is to be allotted for their needs. Don't be deceived into a sense of security by present summer breezes.

Johnson Tract														
Headings			Hdg. Cross Cuts			Rooms			Room Cross Cuts			Gob Increase	Total Gob Area	
Width	Length	Sq.Ft.	Width	Length	Sq.Ft.	Width	Length	Sq.Ft.	Width	Length	Sq.Ft.	Sq.Ft.		
10.1	× 9,600	= 96,960	9.3	× 2,200	= 20,460	15.2	× 8,000	= 121,600	12.2	× 4,000	= 48,800	750,000	.....
15.2	× 3,600	= 54,720	.....	.....	.....	25.3	× 3,000	= 75,900	.....	.....	.....	.....	.....
Total.....		151,680	Total.....		20,460	Total.....		197,500	Total.....		48,800	Total	750,000	925,000
						151,680								
						20,460								
						197,500								
						48,800								
						750,000								
Grand Total = 1,168,440 = Mined area (sq ft). Jan. 1, 1911, to Jan. 1, 1914.														

New Steel Washery of the Locustdale Coal Company

By WILBUR L. CROSS, JR., E. M.

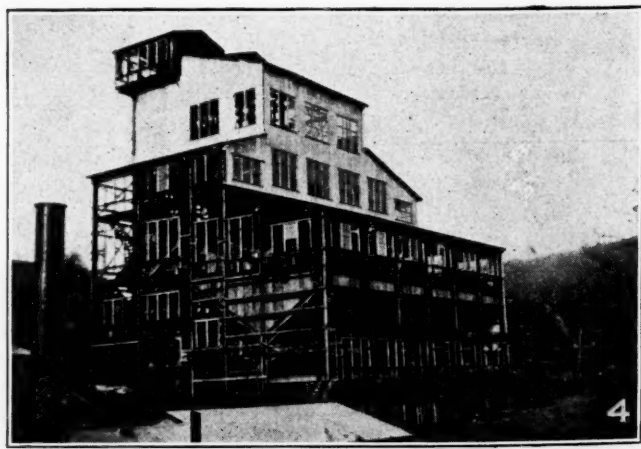
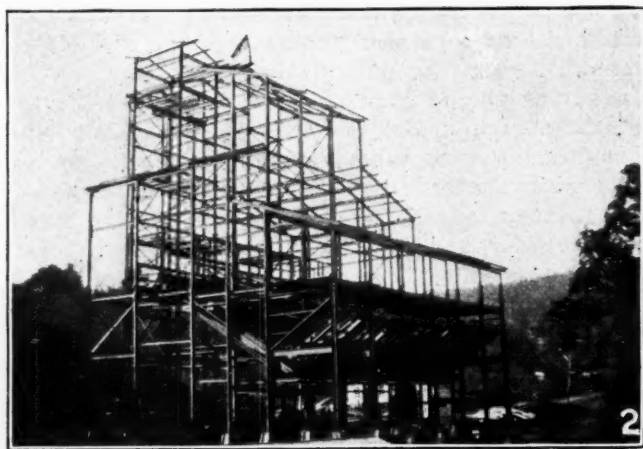
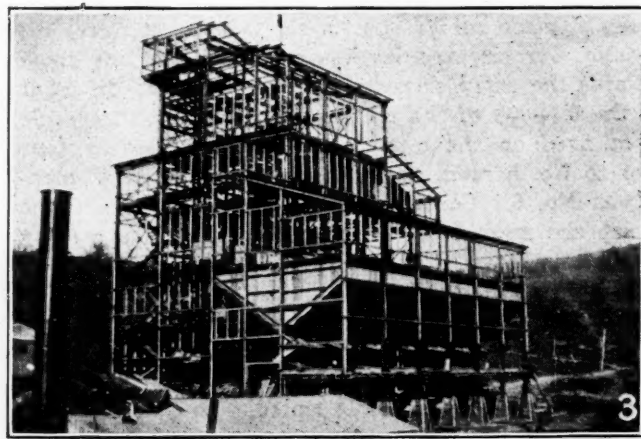
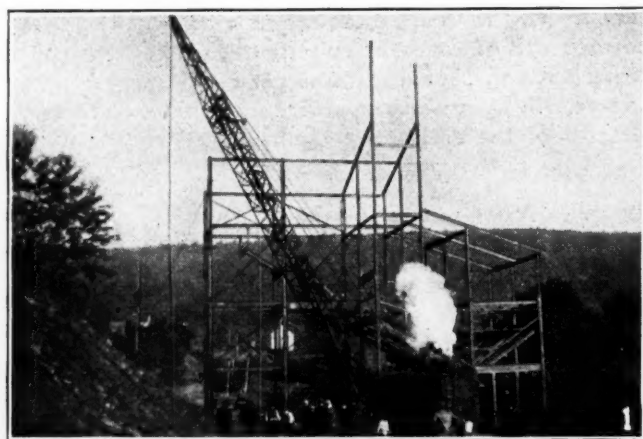
Superintendent, Locustdale Coal Co., Ashland, Penn.

DURING October, 1917, what is believed to be a record in the erection of the steelwork for any coal preparation plant in the anthracite region was made in the erection of the Locustdale washery for the Locustdale Coal Co., at Germantown, near Ashland, Penn. This structure, containing 437,500 lb. of structural steel, was erected by 10 men and a crane in 8 working days of 10 hours each. This time includes the unloading of steel from the railroad cars. Erection does not mean completion, for the steel framework of the structure was not entirely completed at the end of this time. All the bolts were not in place nor were they all tightened up. However, the pockets were completed so that the carpenters could start right in with their work of planking, and the men bolting up kept ahead of the carpenters at all times. Owing to the comparatively short life of the property, the steelwork was bolted together so that it could be taken apart easily when the bank was exhausted. The progress of erection of the washery is shown in Figs. 1 to 4, inclusive. Fig. 1 notes the amount of material assembled at the end of

the first day; material erected at the close of the eighth day is shown in Fig. 2. Fig. 3 shows progress in pocket lining and studding for window sash. Some siding and sash are in place in Fig. 4. A general view of the washery and surroundings is given in Fig. 5. A detailed view of the washery framing, including the diagonal bracing, is illustrated in Fig. 8; some of the chutes, jig casing and other interior work are also shown.

The Heilner banks are being prepared by this washery, and they are located west of Ashland near Locustdale and Germantown, Penn., about one-half mile north of the Potts colliery of the Philadelphia & Reading Coal and Iron Co. They are the property of the Lehigh Valley Coal Co., but are being prepared by the Locustdale Coal Co. on a royalty basis.

These banks are not by any means "refuse," in the sense that this word is used today, for the coal was put down 50 or 60 years ago when standards were much different from what they are today. Tests of the coal prepared show that the broken coal and a good deal of



FIGS. 1, 2, 3 AND 4. LOCUSTDALE WASHERY AT DIFFERENT STAGES OF CONSTRUCTION

Fig. 1—Amount of material assembled at end of first day. Fig. 2—Material erected at close of eighth day. Fig. 3—Shows progress in pocket lining and studding for window sash. Fig. 4—Shows some siding and sash in place

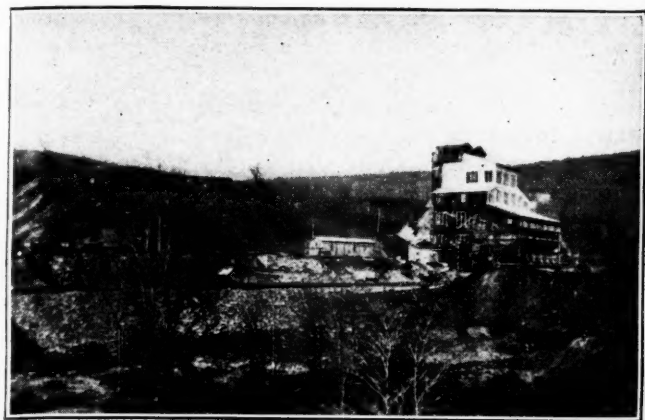


FIG. 5. GENERAL VIEW OF LOCUSTDALE WASHERY

the egg coal found in the bank is either bony (which they throw out) or good coal missed in the former preparation. To some extent this is also true of the stove coal, although in this case a large percentage of good coal went to the bank with the bony. Nut coal is as clean as the average run-of-mine. Pea coal and buckwheat from the bank need not be jigged, as the slate percentage is far below the limit.

Due to peculiar surface conditions, it is necessary to load the bank into cars by means of a steam shovel; hoist the cars up a plane 700 ft. in length on a pitch of 14 deg.; thence by locomotive 3500 ft. to a trestle, located about 600 ft. west of and at the same elevation as the top of the washery. The cars are dumped here and the coal slushed down a chute of terra cotta pipe on a pitch of 2 in. to the foot, into the bottom of the ele-

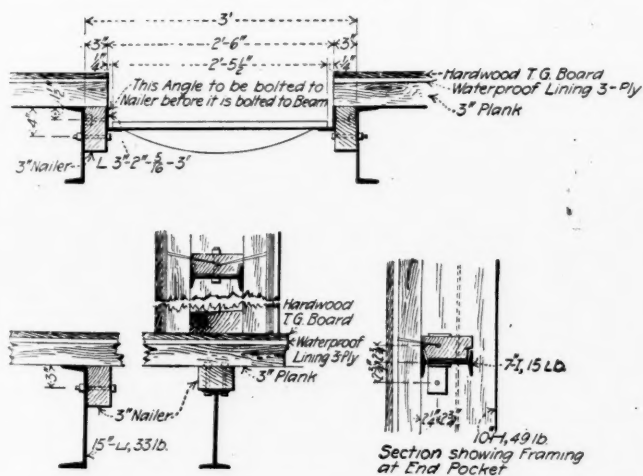


FIG. 6. DETAILS OF CONSTRUCTION

vators. To have delivered this material at the top of the structure in cars would have been the ideal plan. This could have been done, but only at an expense not justified by the life of the property. The trestle dump and slushing method has its advantages in that it permits the storage of a large quantity of material, thus allowing constant operation of and constant feed into the washery in case of delayed transportation or delays at the steam shovel.

Water for slushing and for use in the washery is obtained from the old Heilner mine workings, the original source of this coal. A Worthington type B. S. single-stage centrifugal pump delivers this water at the

rate of 1000 gal. per min. against a total static head of 125 ft. through a 10-in. wood pipe to the hose used for slushing and to the tank in the washery. This pump is belt-driven by a 60-hp., 2200-volt, three-phase, 60-cycle slip-ring induction motor. With the exception of the steam shovel and locomotives, this operation depends entirely on electric current purchased from the Eastern Pennsylvania Light, Heat and Power Co. and uses 2200-volt motors.

The hoist used to pull the cars up the plane is an old balanced plane hoist put in for emergency use and geared to a 125-hp. Allis-Chalmers slip-ring 2200-volt motor. This hoists three cars of 120 cu.ft. capacity at one time on the level. A new Flory hoist now being

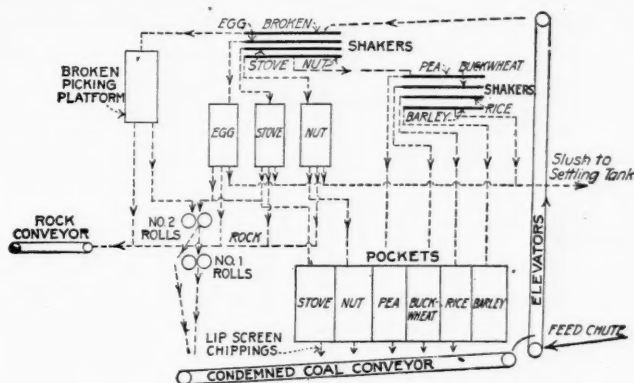


FIG. 7. LOCUSTDALE FLOW SHEET

erected will replace the old hoisting plant. It will be driven by a Western Electric 200-hp., slip-ring, 2200-volt motor and will hoist four cars per trip on the balanced plane.

The washery is driven by a 150-hp., 2200-volt, three-

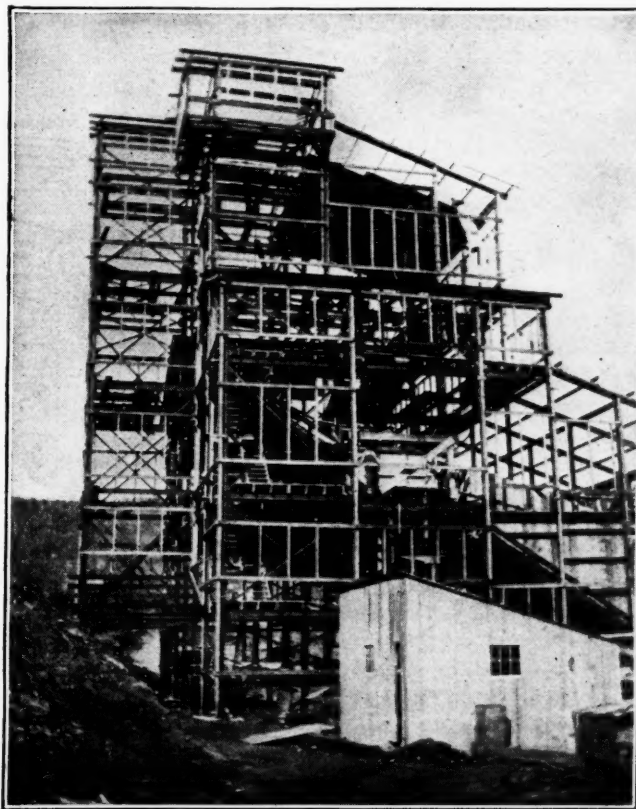


FIG. 8. DETAILED VIEW OF FRAMING

the upper deck of shakers is broken and small steam-boat. The percentage of rock is high and the tonnage low. Two boys pick the coal and bony from this size and send it down a spiral chute to the No. 2 rolls.

Egg coal has a large percentage of rock and bony coal in it. From the shaker it goes to the jig pockets and thence to two Wilmot type D Simplex jigs. Part of the coal delivered by the jigs goes to a small pocket for use in the locomotives. The remainder goes to the No. 2 rolls to be broken down. There is too much bony and flat coal of bad appearance in this size to permit of direct shipment.

Stove coal from the shaker goes to the jig pockets and thence to two Wilmot type D Simplex jigs. There is too much light bony and coal of a bad appearance in the jigged coal to permit of its being loaded under strict inspection. Two boys pick this bad stuff from the coal. The pickings are sent to the No. 1 rolls and broken to pea and smaller. Nut coal from the shakers goes in a spiral chute to the jig pockets, thence to three Wilmot type D Simplex jigs. The coal from these jigs is excellent and needs no picking.

The slush product from the upper bank of shakers goes to the lower bank of shakers—pea, buckwheat, rice and barley sizes. These shakers are of the same type as the prepared shakers but are 30 ft. long. The "Beaver" type of spray is used over all of the shakers. Pea coal, buckwheat, rice and barley from their respective shakers go direct to the pockets. Pea coal averages about 6½ per cent. of slate, buckwheat rarely runs over 8 per cent., with rice and barley looking fine.

An inspection of the flow sheet (Fig. 7) shows that coal from the No. 2 rolls goes either to the condemned coal conveyor or is rebroken in the No. 3 rolls. There are certain parts of the bank which contain an unusual percentage of bony coal. When coal is coming from those sections, the broken and egg are put through both sets of rolls to keep the bony out of the stove and nut coal. Although it is not a good plan to run from roll to roll without an intermediate screening, this is done so infrequently and the character of the coal is such that there is really little if any loss. Coal from either or both sets of rolls goes to the condemned coal conveyor, discharging into the chute and elevators.

All of the rock goes to a common rock chute which discharges into the rock conveyor line. This line takes it across the railroad track to a hopper, from which it is conveyed in dumpers to the rock bank. Although the plant is run by electricity, a small boiler must be maintained during the winter for heating purposes. This boiler is supplied with boiler coal by means of the rock line during noon and after quitting time. This is done by having a removable pan in the rock line and a chute from this point in the rock line to the boiler house coal pocket. This plan saves an extra conveyor line. This conveyor line is made up of Wilmot light 9-in. Keystone rivetless chains with 8 x 18-in. flights. The plates in the bottom and sides are cast iron and are interchangeable. The condemned coal line is a duplicate of the rock line. This rock line, which is detached from the washery, is driven by a General Electric 35-hp., 2200-volt, slip-ring motor with variable speed control. It is 185 ft. in length, and when well loaded the motor is taxed to its full capacity.

The slush and water from the hopper under the lower

deck of shakers flows into the main slush trough under the jigs, thence out to the slush bank. In the near future it will go to a settling tank now under construction.

The force on preparation is as follows: One breaker boss, 1 jig boss, 1 jig runner, 1 oiler, 1 machinery attendant, 1 motor runner, 2 pickers on broken coal, 2 pickers on stove coal, 1 cleaner up—a total of 11 men and boys. On the car road are 1 loader boss and coal inspector and 3 loaders—a total of 4 men.

The water for preparation is forced by the centrifugal pumps (previously mentioned) to a 5000-gal. wooden storage tank at the top of the washery. The four outlets are all 3-in. pipe governed by Eynon-Evans special brass body globe valves. Line No. 1 feeds the sprays on the upper shakers; No. 2 the sprays on the lower shakers; No. 3 the car road sprays and No. 4 the jigs. To save valves a trough was built behind and above the jigs, which is fed by line No. 4. A special inexpensive casting is inserted in this trough, and a wooden plug fits in this casting. By pulling the plug, the jig may be quickly and easily filled. An automatic arrangement was tried here depending on a float in the water of the jig. It was not satisfactory, owing to the continual disturbance of the jig water. With the trough on the same level as the jig, an admirable automatic feed can be easily installed.

Research Fellowships in the College of Mines, University of Washington

The College of Mines of the University of Washington offers five fellowships in Mining and Metallurgical Research in coöperative work with the Bureau of Mines. The fellowships are open to graduates of universities and technical schools who are properly qualified to undertake research investigations. The value of each fellowship is \$720 per year of twelve months, beginning July 1, 1918. Fellowship holders are required to register as graduate students and to become candidates for the degree of Master of Science in Mining Engineering, or Metallurgy, unless an equivalent degree has previously been earned.

The purpose of these fellowships is to undertake the solution of problems in mining and metallurgy which are of special importance to the State of Washington, Alaska, and the Pacific Northwest. For the year 1918-1919 the following subjects have been selected for investigation: (1) Washington mining problems. (2) Ore concentration, including flotation and electromagnetic processes. (3) Electrometallurgy; electrothermic and electrolytic investigations. (4) Coal washing. (5) Utilization of the nonmetallic resources of Washington.

Applicants should send a copy of their collegiate records from the registrar's office of the college where they have been, or will be, graduated. They should also state their professional experience and give the names and addresses of at least three persons who are familiar with the character, training and ability of the applicant. Applicants liable for military service should state their classification and other pertinent facts relating to the draft. Applications are due not later than May 30, and should be addressed to the Dean, College of Mines, Seattle, Washington.

Graphic Determination of Prices

By J. D. SKINNER

Rocky Mountain Fuel Co., Denver, Colo.

SYNOPSIS—Varying prices for the different sizes of coal produced at the mine make it advisable to be able to determine which should be sold—run-of-mine, or lump and slack. The accompanying curves make such determinations easy.

WHEN varying prices are received for run-of-mine, lump and slack coal and certain percentages of the two latter are made, it is somewhat difficult to determine quickly whether it will be advantageous to sell the mine output with or without preparation. And in whatever condition the coal is disposed of, it is advisable to know both "why" and "how much."

To provide a means and basis for quickly comparing the prices of these three grades of coal and determining which will yield the greatest return, I have constructed the accompanying charts. These are based on the following simple calculations:

Let

- P = Price of mine-run per ton;
- x = Corresponding price of lump per ton;
- y = Corresponding price of slack per ton;
- A = Percentage of lump made;
- B = Percentage of slack made.

Hence $A + B = 100$.

Problem—Given P , A and B to find x and y .

In one ton of mine-run there is an amount of lump represented by the decimal fraction A and an amount of slack represented by the decimal fraction B . Hence, when the portion A of a ton of lump is sold at x dollars per ton, and the portion B of a ton of slack is sold

at y dollars per ton, the total receipts will be P dollars; and we have the relation

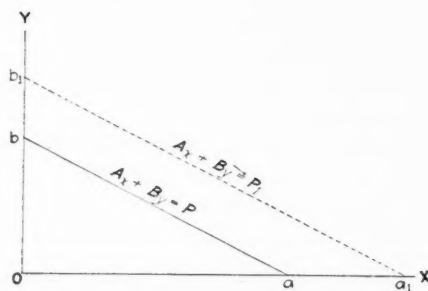
$$Ax + By = P \quad (1)$$

Since equation (1) is of the first degree, its graph is a straight line.

Letting $x = 0$, the intercept on the Y-axis is $Ob = \frac{P}{B}$.

Letting $y = 0$, the intercept on the X-axis is $Oa = \frac{P}{A}$.

Hence, for given values of A , B and P , the graph of (1) can be drawn by connecting the intercepts. If A and B are supposed to be constant and x and y have



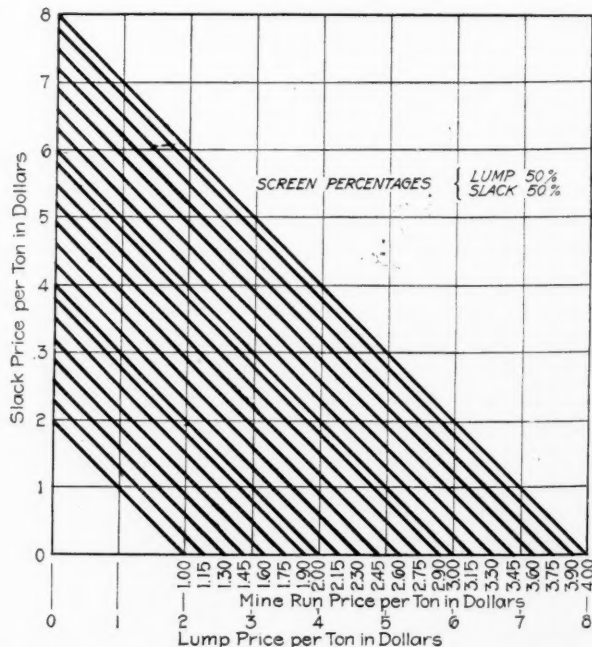
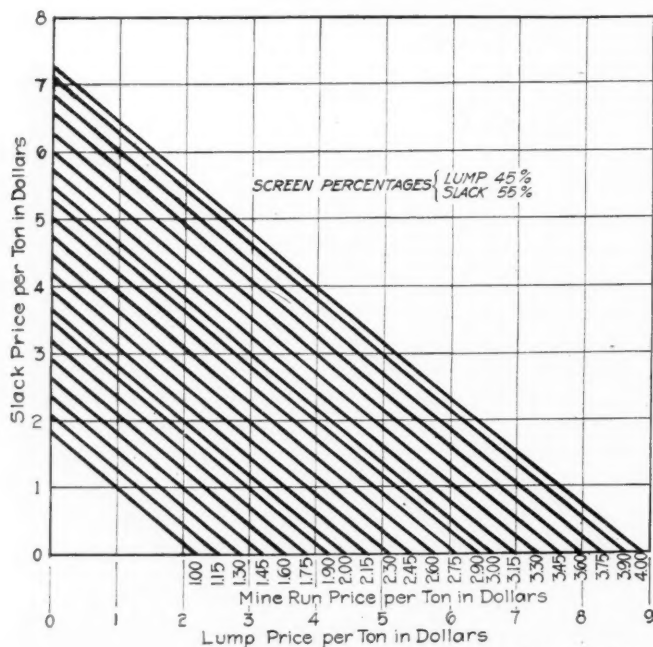
THE GRAPH OF EQUATION (1)

different values, a series of graphs may be constructed for different values of P . That these lines will all be parallel may be shown as follows:

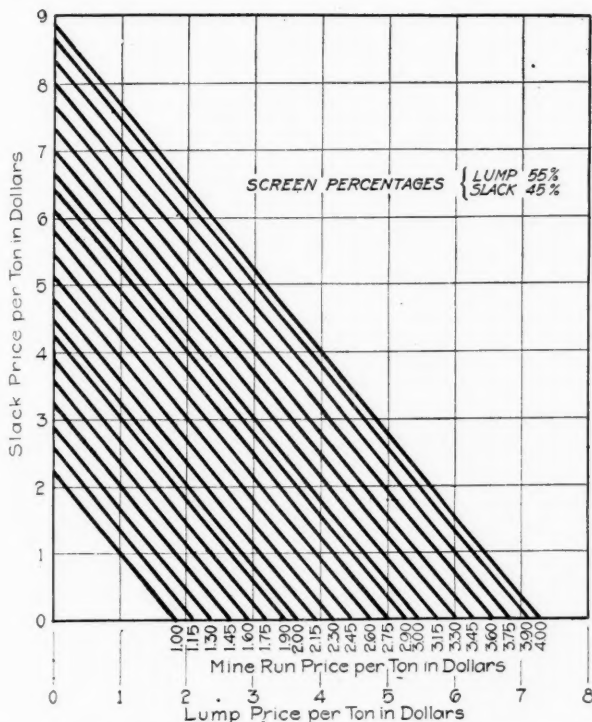
Transposing (1) and dividing both terms by B to put it in the slope-intercept form:

$$y = -\frac{Ax}{B} + \frac{P}{B}$$

Hence, the slope of (1) or $M = -\frac{A}{B}$.



COAL PRICES SHOWN GRAPHICALLY FOR 45 AND 50 PER CENT. OF LUMP

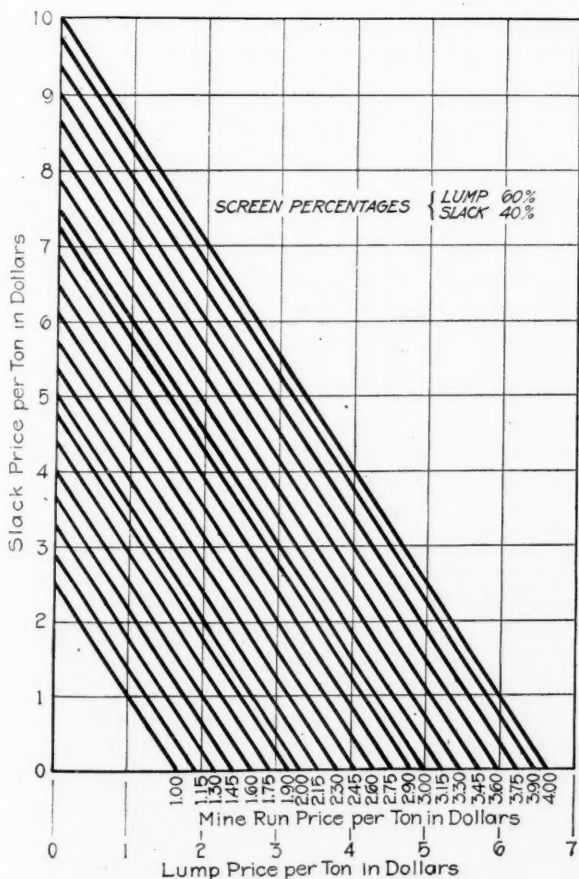


PRICE DETERMINATION FOR COAL CONTAINING 55 PER CENT. LUMP

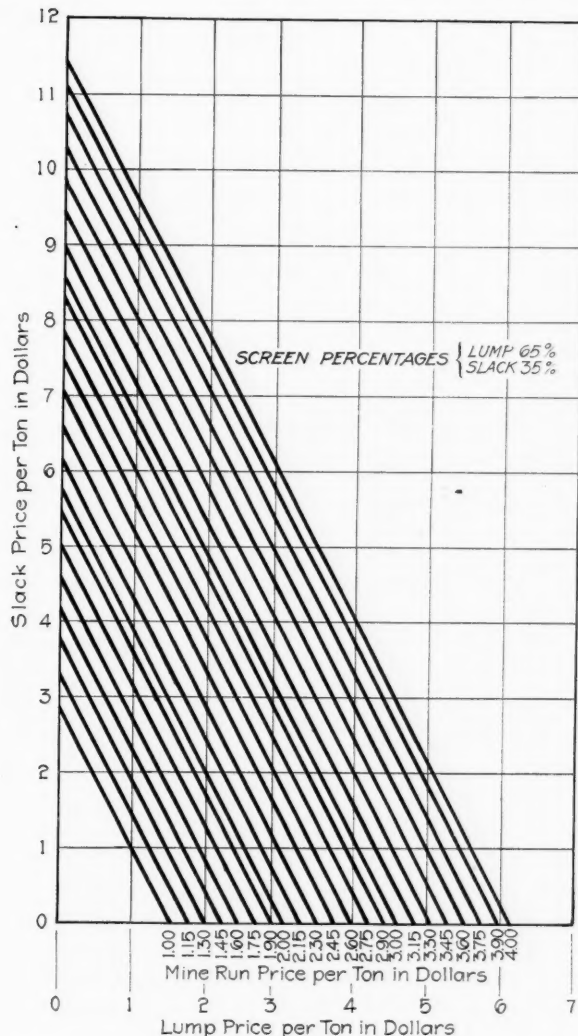
Now the equation of any other line having a different value of P , say P_1 , is

$$y = -\frac{Ax}{B} + \frac{P_1}{B} \quad (2)$$

Since the slope of (2) is likewise $-\frac{A}{B}$, (1) and (2)



GRAPHIC PRICES FOR COAL CONTAINING 60 PER CENT. LUMP



GRAPHIC PRICE DETERMINATION OF A COAL CONTAINING 65 PER CENT. OF LUMP

make the same angle with the axis of X and hence are parallel.

The following illustrates the method of finding the intercepts:

Screen percentages { Lump 70 per cent. Slack 30 per cent.		
Hence $A = 0.70$ and $B = 0.30$		
Price of Mine-Run P	Intercept on X-Axis $Oa = \frac{P}{A}$	Intercept on Y-Axis $Ob = \frac{P}{B}$
\$1.00	\$1.43	\$3.33
1.15	1.64	3.83
1.30	1.86	4.33
Etc.	Etc.	Etc.

METHOD OF USING THE DIAGRAMS

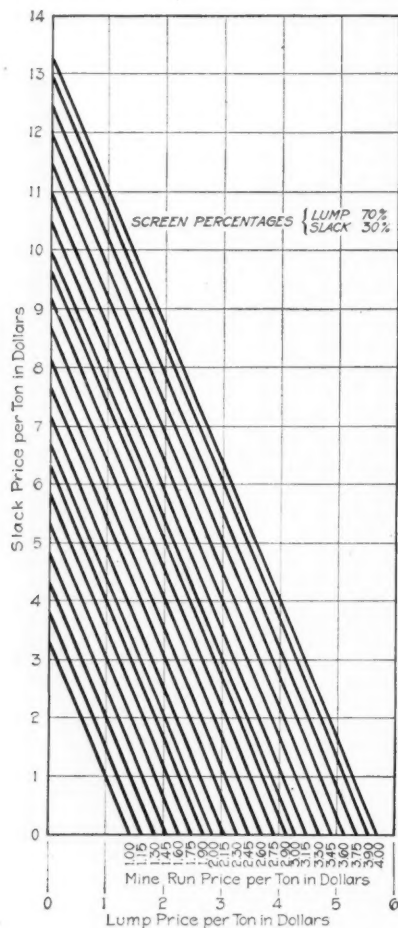
Example 1. Given cost of mine-run f.o.b. railroad cars at mine (including cost of screening lump and slack) = \$2.30 per ton. Profit 15c. per ton. Selling price of lump f.o.b. mine \$3.20 per ton. Screen product: 70 per cent. lump; 30 per cent. slack.

Find corresponding price, f.o.b. mine, that slack must be sold for in order that the combined profit on lump and slack will be 15c. per ton on a mine-run basis.

Solution—On the diagram for 70 per cent. lump and 30 per cent. slack follow along the diagonal line marked \$2.45 (the selling price of mine-run) until it intersects the vertical line through \$3.20 (the selling price of lump to the scale marked on the axis OY). The dis-

tance this point of intersection is above OX , measured along the line through \$3.20 and perpendicular to OX , is the corresponding price of slack, which, by the scale on the axis OY , is \$0.70. If the price of slack had been given instead, the corresponding price of lump could be found in a similar manner.

Example 2. Given selling price of lump = \$4.10



GRAPHIC PRICE FOR MINE-RUN CONTAINING 70 PER CENT. LUMP

f.o.b. mine. Selling price of slack = \$1.20 f.o.b. mine. Cost of mine-run (including screening, etc.) = \$2.90 f.o.b. mine. Screen product 65 per cent. lump; 35 per cent. slack.

Find profit per ton of mine-run sold as lump and slack.

Solution—On the diagram for 65 per cent. lump and 35 per cent. slack find the intersection of the line perpendicular to OX at \$4.10 with the line perpendicular to OY at \$1.20. This point of intersection lies a little over halfway from the diagonal marked \$3 to that marked \$3.15, which gives \$3.08 for the corresponding selling price of mine-run. Hence the profit per ton mine-run at the mine is \$3.08 — \$2.90 = \$0.18.

Example 3. Given selling price of mine-run, including operator's profit = \$2.90 per ton f.o.b. mine. No market for slack, which therefore has to be wasted. Screen product: 50 per cent. lump; 50 per cent. slack.

Find corresponding price, f.o.b. mine, at which lump must be sold to obtain the given price for mine-run.

Solution—On the diagram for 50 per cent. lump and 50 per cent. slack follow along the diagonal marked \$2.90 until it intersects the axis OX (on which the

selling price of slack is zero). This point of intersection is at \$5.80, which is the required price of lump.

Mine-run prices between those given may be secured by laying a transparent ruler between and parallel to the proper diagonal lines and reading its intersections with the vertical and horizontal lines.

These diagrams also can be used to compute costs as well as selling prices.

Record Tonnage in British Columbia

BY ROBERT DUNN

Victoria, B. C.

The demand of the Dominion authorities for more coal continues to meet with good response from the operators of British Columbia. The latest official returns show that the total output of coal for British Columbia for the first quarter of the year was 673,044 tons, which is a gain of 19,213 tons over the same period of 1917.

The production by districts is given as follows:

	Tons
Vancouver Island.....	425,759
Crow's Nest Pass.....	199,700
Nicola Princeton.....	47,585
Total.....	673,044

The production of the various companies was as follows:

Vancouver Island:	Tons
Western Fuel Co.....	198,467
Canadian Collieries (D) Ltd.....	189,560
Pacific Coast Coal Mines.....	25,779
Nanose Collieries.....	11,953
Crow's Nest District:	
Crow's Nest Pass Coal Co.....	175,378
Corbin Coal & Coke Co.....	24,322
	199,700
Nicola Princeton District:	
Middlesboro Collieries.....	30,071
Fleming Coal Co.....	4,152
Princeton Collieries.....	13,362

The Vancouver Island collieries have produced upward of half a million tons during the first quarter in spite of the fact that three producing mines have closed down; namely, the Jingle Pot mine, which has not been operated on account of a fire in the underground workings; the South Wellington mine of the Pacific Coast Coal Mines, which, being worked out, has been abandoned; and the No. 4 mines of the Canadian Collieries, abandoned for the same reason.

The Western Fuel Co. produced 29,967 tons more in the first three months of 1918 than in the opening quarters of the previous year; the Nanose Collieries show an increase of 9172 tons; while the output of the Canadian Collieries and the Pacific Coast Coal Co. has fallen off slightly. This, however, is expected to be more than offset by the opening of two new mines, which now are being developed and equipped, one at South Wellington by the Canadian Collieries (D) Ltd. and the other at Cassidy's Siding, Vancouver Island, by the Granby Consolidated Mining, Smelting and Power Company.

In the Crow's Nest District, the Crow's Nest Pass Coal Co. produced 24,708 tons more in the first quarter of this year than in the first months of 1917, while the Corbin Coal and Coke Co. also has increased its production to the extent of 8716 tons.

The collieries of the Nicola-Princeton District show a similar improvement, the Middlesboro Collieries were increasing their output 14,963 tons, although the Princeton Collieries have dropped about 3000 tons.

Pulverized Coal for Industrial Purposes*

By JOHN CUNLIFFE
Vancouver, British Columbia

THE employment of pulverized coal in various industrial processes offers many advantages over the use of other fuels. Industries of the western provinces of Canada that now rely largely on Californic crude oil will sooner or later, through stress of circumstances, be compelled to adopt some substitute. Of the available fuels powdered coal offers the most promising solution.

BROADLY speaking, coal may be described as the stored-up heat of the sun of former ages. To describe in definite words the meaning of the word "coal" is not simple. However, coal may be defined as a solid stratified substance, capable of undergoing combustion in contact with oxygen, and not containing sufficient earthy impurities to prevent its being applied as a source of heat in furnaces and fireplaces. It varies in color from brown to black.

There is nothing authentic in history to indicate by whom or how the heating value of coal was discovered. It was probably due to chance or accident, with all records lost in antiquity. The Indians of Nanaimo, Vancouver Island, knew of the heating power of coal many years before its exploitation there by white men, and termed it in their jargon "the black rock that burns." Further north on the east coast of that island the Indians discovered coal many years ago, and named the stream on which it was found "Suquash River." Interpreted, the Indian word "suquash" meant "the rock that burns." It is probable our ancestors discovered the heating value of coal in a similar manner.

The heating value of various coals was determined by scientists many years ago, and public attention from time to time has been called to the great waste in our crude methods of burning it. The furnaces and fireplaces of today are but little improved from those of our grandfather's time. It has remained for 20th century science to solve to some small extent this problem of waste. To illustrate how serious this waste is, let us take for example the case of steam generation and its application today.

WORK DONE BY ONE POUND OF SOFT COAL

A single pound of good bituminous coal contains about 14,000 B.t.u. of heat, and each unit is capable of conversion into 778 ft.-lb. of mechanical work. The measure of mechanical work known as a horsepower is equal to 33,000 ft.-lb. per minute, or 1,980,000 ft.-lb. per hour. The heat units in one pound of coal, if it were possible to completely convert them into mechanical work, would equal $5\frac{1}{2}$ hp.-hr. At that rate, 1000 hp. could be generated for 10 hours on less than one ton of coal. In practice, the best modern steam engines use from 8 to 10 tons of coal to maintain 1000 hp. continuously for 10 hours, and the average small steam plant requires from 20 to 30 tons or more.

The foregoing is only a single instance of the many

waste problems engineers are grappling with, and hope to solve, or at least reduce as far as possible. The successful use of pulverized coal for industrial purposes is a step in the right direction. Its demonstrated safety and economy augur well for an early solution of a large slice of the vexed heat waste problem. The advance is made on correct principles, and as soon as the production and application of powdered coal is better understood, it is safe to predict that its sphere of usefulness will be greatly extended.

PULVERIZED COAL AS AN INDUSTRIAL FUEL

The price of fuel for manufacturing purposes is an important factor in the cost of production, especially in the case of large consumers, such as smelters, iron and steel manufacturers, railways, steamships, etc.

The high price of coal, legislation curtailing the spark nuisance, the economy and ease of handling oil for steaming, are the chief reasons advanced by the railways, the mercantile marine, and the owners and managers of apartment houses for changing from coal to oil fuel for steaming and heating purposes. It is not proposed to question the accuracy of those statements, nor can they be conceded correct in many particulars. The industries which have made the change were no doubt satisfied before doing so that the step was a wise one. In any case the use of pulverized coal has been demonstrated beyond doubt to give better results than any other fuel for many manufacturing purposes. It is more economical than oil fuel, producer gas, or coal burned in the ordinary manner for many purposes; its milling, distribution and burning can be done at a low cost, it is simple to use and does not call for laborious work or any particular skill in operation; furthermore, if properly applied a great economy in fuel can be effected.

Engineers have known for many years the great waste of heat which takes place when coal is used direct for manufacturing purposes. Because of the wide application and long use of the steam engine, this is more noticeable in the production of steam than in many other uses. The work delivered by the ordinary steam plant of our time seldom exceeds 10 per cent. of the total energy of the coal consumed, and in many cases much less. The conversion of coal into "producer gas," and its application to industrial uses, was a great step forward. The heat returns from producer gas generated from a given amount of coal were several times greater than could be realized from burning the raw coal, and

*Paper read before the Vancouver Chamber of Mines.

where conditions are suitable for its application this gas is a highly economical fuel. In districts commanding a market for the residual products, producer gas is a source of cheap power, particularly if the capacity of the plant is large and adjacent to some large city or cities to which the surplus gas may be piped and sold. The great distances separating the centers of population of British Columbia do not lend themselves to the economical establishment of such plants beyond the cities of Vancouver and Victoria.

Ostensibly, because of the high price of coal, fuel oil has replaced it to a considerable extent for manufacturing purposes in this province. Fuel oil gave more heat volume for volume, reduced the labor in firing, and is supposed to prevent forest fires (long attributed to sparks from locomotives burning ordinary coal) along the routes of railways. Oil fuel has been extensively applied to industrial uses in the eastern United States, but the supply failed to keep pace with the expansion in consumption.

Improved methods of distillation reduced the quantity of residual fuel for manufacturing purposes, research work has shown that quite a number of the components of crude oil are far too valuable for such use, and the scarcity and uncertain supply caused engineers and manufacturers to cast about for a more permanent supply of cheap fuel. As on many previous occasions science solved the difficulty, surmounted it by the use of pulverized coal, and made a permanent and cheap supply of good fuel available to manufacturers for all time. Smoke in industrial cities has been a recognized nuisance for a long time, and has from time to time attracted considerable attention. Legislation to curtail it is in effect in several of the industrial centers of the United States, and is now being grappled with by the government of the city of Vancouver. Mr. Bird, chief smoke inspector of Chicago, where the smoke nuisance is much less than in Pittsburgh, estimates the loss due to wear and tear of clothing, house and building, cleaning, etc., as equivalent to \$17,600,000 a year, or a per capita tax of \$8 for that city. This estimate neglects entirely the injurious effect of smoke on the health of the people, and the direct loss of fuel energy.

Smoke is the direct product of incomplete combustion and has been the bugbear of all large fuel consumers. For years their best efforts have been directed to train firemen to prevent it. So long as firing is done by hand, and smoke elimination calls for better attention on the

part of the stoker, with the human element a variable factor, it is doubtful if any radical improvement can be expected.

The mechanical stoker promised an improvement and was a step in the right direction. But even here considerable difficulty is experienced in gaging an accurate air supply for the fuel, securing proper furnace construction, in the varying qualities of fuels at different localities and works, as well as from many other causes too comprehensive to enumerate in a brief paper of this kind. Pulverized coal, properly prepared and burned, promises a satisfactory remedy for the smoke nuisance, and when its merits are better understood by the public and its use becomes more widely extended bids fair to make the cities of the future smokeless.

To John V. Culliney, superintendent of the American Iron and Steel Co., is due the credit of being the originator of the first really successful system of burning pulverized coal as a fuel for metallurgical purposes. By perseverance, he worked out and perfected a fuel-controlling device that turned failure into success, and from a small beginning over a decade ago, the use of this fuel has extended to large proportions at the present time.

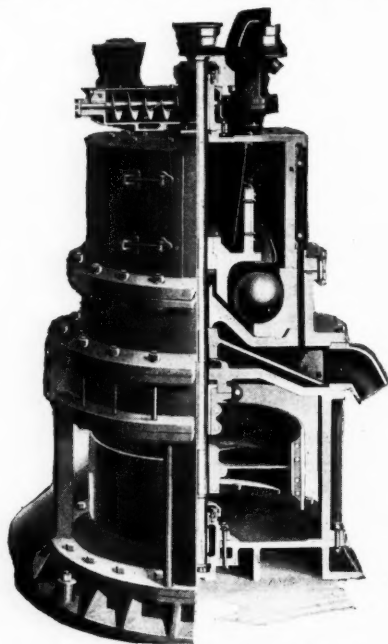
This company alone is now operating 77 furnaces with this fuel, is doing the work of puddling, busheling, rod heating, upsetting, etc., and consumes in its operations over 150 tons of coal per day.

PREPARATION, APPLICATION AND BURNING

The value of any fuel depends on the amount of its heat that can be converted into useful work. No fuel is a cure-all. Results from different coals vary according to the composition and traits inherent in each, and consequently this applies to coal in the pulverized state as well as that burned in the ordinary form.

Speaking generally, if a good supply of bituminous coal is available at reasonable cost, and the fuel consumption will warrant the installation of a coal handling, milling, distributing and burning equipment, the use of pulverized coal will effect a large saving. To obtain the best results, powdered coal must be dry and fine; and by "dry" is meant that it must not contain more than 1 per cent. of moisture. This has a double advantage; dry coal requires less power to pulverize, and better results are obtained in burning it.

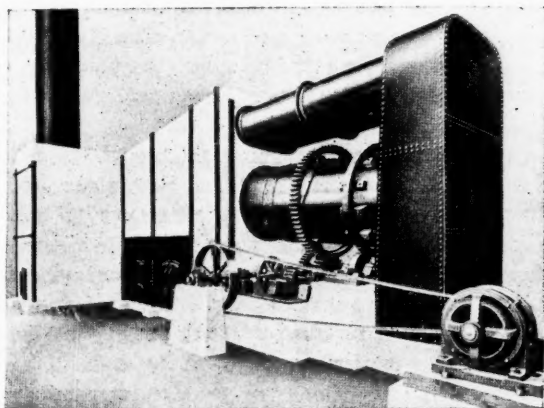
By "fine" is meant that 93 to 95 per cent. should pass through a 100 mesh sieve, or 80 to 85 per cent. through a 200 mesh. In this state the particles are so finely divided that in a properly constructed burning apparatus each one is surrounded by the amount of air necessary for perfect combustion and the entire fuel energy of the coal is liberated instantly. It is obvious the finer the coal the faster it will burn, since coal in a finely divided state exposes a much greater surface to the action of the flame and air than lump coal. The volatile gases of the pulverized coal ignite instantly upon the entry of the fuel into the combustion chamber; the fixed carbon in suspension is consumed by the heat of the volatiles, and to the casual observer the flame resembles that of oil or gas. By the addition of more air or fuel the flame can be varied at the will of the operator, the control simply consisting of opening or closing the valves that regulate the supplies. The fire is under ab-



HALF SECTIONAL VIEW OF A COAL PULVERIZER

solute control at all times, and the entire combustible content of the coal is converted into heat.

Without going into details of specifications or costs, a general description of a plant necessary for the preparation and burning of powdered coal is approximately as follows: From the source of supply the coal



COAL DRYING KILN WITH DRIVING MOTOR

is delivered to a crusher and reduced to a suitable size for delivery to a pulverizer. In passing from the crusher to the pulverizer it is subjected to magnetic separation, to insure the removal of any tramp iron or steel it may contain. After passing over the separator, it is raised to a storage bin from which it is fed to the dryer and thence to a dried coal bin. From here it is led to the pulverizer. The finished article is elevated to a suitable bin or receptacle, from which it is distributed by a conveyor to individual hoppers at each furnace and thence fed to the burners. The complete operation is nearly automatic and under absolute control all the time.

The controller or device which regulates the feed to the burners is to the powdered coal furnace what the carburetor is to a gasoline engine. It must be flexible in adjustment, and since it determines the amount of fuel supplied to each burner it is attached to the bottom of the coal hopper at each furnace. It consists of two screws, the upper one propelling the coal forward to a certain point, at which it falls in a steady stream before an opening through which issues a jet of low pressure air, and by which it is carried to the burner. If the quantity delivered by the upper screw is greater than the air supply can carry, the excess falls into a cavity beneath in which another screw of a greater pitch works in an opposite direction. The overflow is thus returned to the hopper.

The construction of the whole apparatus makes it impossible to jam. It is practically foolproof and permits any portion of the falling stream of coal up to the capacity of the screw being used at the will of the operator, simply by turning on more or less air.

The quantity of air passing the controller is about one-seventh the amount required for complete combustion. The balance is of much lower pressure and enters the furnace at the burners. The controller screws are operated by chain drive, or connected direct to variable speed motors as conditions may require.

The current of controller air serves a double purpose. It not only forces the coal to the burner, but in picking

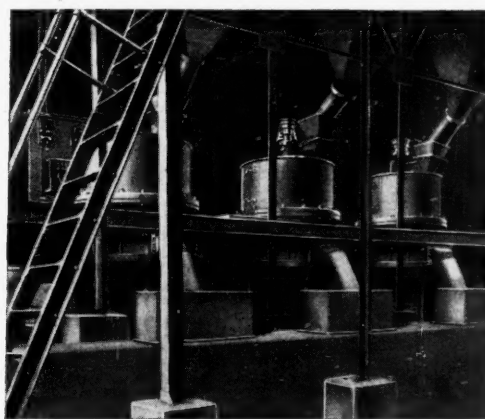
it up gets intimately commingled with it, and both enter the furnace in a well-mixed cloud. This cloud is ignited immediately upon its entry into the combustion chamber, and meeting there the balance of air necessary for complete combustion bursts into a clean flame. The length of the flame can be changed by simply adjusting the burner to suit any desired purpose. The volatile content of the coal has also a material effect on the length and nature of the flame, but proper adjustment may be made therefor immediately. The use of this new fuel has been so simplified that operators soon become accustomed to it, and have no difficulty in regulating the furnaces to meet any necessary requirements.

For small furnaces, where a more or less uniform class of work is done, such as rod-heating, heating small forgings, in nut and spike furnaces, etc., the controller is so speeded as to give the maximum amount of fuel required for each heat, and is so arranged that the operator cannot exceed this amount. In large furnaces such as openhearth, continuous billet, reheating, etc., a variable change-speed device is employed, and is usually capable of a wide range of operations.

There are some cases where it is desirable or even necessary to maintain a constant degree of heat in the furnace, and variation would interfere with results. In others, such as puddling furnaces, etc., it is necessary to push the furnace at one period and slack off or hold the heat uniform at another. All these conditions can be satisfactorily accomplished in the control of a pulverized-coal fire.

The following extracts are from papers by H. R. Barnhurst, mechanical engineer, of the Fuller-Lehigh Pulverizing Co., read before the Engineers' Society of Pennsylvania, and the American Institute of Mining Engineers, at New York:

In 1912 the Missouri, Kansas & Texas Railroad Co. installed at the power house of its new shops at Parsons, Kan., eight 250-hp. O'Brien boilers of the Heine water-tube type, equipped to use natural gas or oil as fuel. Because of difficulties in getting supplies of gas or oil, it was decided to use powdered coal made from the low grade coals



VIEW IN A COAL-PULVERIZING PLANT

of the neighborhood instead. These coals ranged from 41 to 47 per cent. of fixed carbon, 26 to 32 per cent. volatile matter, and ash from 14 to 20 per cent. This equipment now in operation is giving better results than was obtained from gas or oil, and promises to be a pronounced success.

The cost of preparing pulverized coal depends to some extent on the quantity handled, the cost of dryer fuel, and the cost of power necessary for operating. The quantity of fuel required for drying depends on the amount of moisture

to be driven off; usually, 1 lb. of coal will evaporate 6 lb. of water in a well-constructed dryer.

The help necessary in using pulverized fuel is small. One man can operate a dryer of 6 or 8 tons hourly capacity, and one man can attend mills capable of grinding and delivering the same amount of coal to the furnace hoppers. The cost of repairs will not exceed 2c. per ton, and the power necessary for the complete operation is about 17 hp.-hr. per ton of product delivered.

Because with pulverized coal all the heating value of the fuel is available, considerable economies are manifest over other fuels. In continuous billet-heating furnaces a saving of 24 per cent. is made. In openhearth furnaces, 30 to 35 per cent. is saved as compared with the same furnaces fired with producer gas. In copper smelting a saving of 30 per cent. is effected, and for steaming, both locomotive and stationary boilers, a saving of from 20 to 30 per cent. is attained.

Regarding its effect on furnace brickwork and other linings, this is similar to what would arise from equal heat generated from coal or oil firing. Deterioration may be reduced to a minimum if short-flame firing and its corresponding low gas velocity is adopted. As with gas firing, the effect upon the brickwork is mostly confined to points where the path of the heated gases is diverted, as through vertical ports from horizontal passages.

This account would not be complete without speaking of the ash, most of which goes up the chimney or outlet for the products of combustion. In puddling and heating furnaces the small amount of ash left is carried off with the slag. It has given no trouble in the checker-work of openhearth furnaces. In steam-boiler firing the ash is best disposed of through a hopper bottom in the furnace.

There is no particular danger in the milling or use of pulverized coal if rational precautions are taken, and certainly the hazards of handling are not greater than those accompanying the use of oil or producer gas. Pulverized coal is subject to spontaneous combustion only in a degree similar to the coal from which it is manufactured. All well-constructed milling plants are made dust-tight, and open lights should be forbidden in such buildings. It may be safely stored in proper receptacles for five or six days without trouble; in practice, this has been done on several occasions. Storing for any appreciable time is not recommended, it is advisable to mill in about 10 hours all that is required for 24 hours. Much has yet to be learned about the best methods of milling, storage, handling and burning this new fuel, and like all other new things it remains for practical use to discover where improvements can be made.

OBJECTIONS TO STORAGE OF PULVERIZED COAL

The use and manipulation of pulverized coal are now much better understood than in 1912 when Mr. Barnhurst contributed the foregoing paper.

The objections put forward against the storage of pulverized coal over long periods are that coal in a finely divided state, even when inclosed in air-tight receptacles, loses much of its occluded gases, and a considerable part of its value as a fuel. Further, difficulty may be experienced from caking due to excessive weight in the bins, and the material may not run freely.

Our remarks so far have been confined to the dry method of pulverizing and burning coal. However, the preparation and burning of coal in the powdered form is not confined to the dry method alone.

There is another machine on the market for doing this kind of work known as the "Aero pulverizer," so called because of the fact that an exhaust fan causes an induced current of air to circulate through the pulverizing machine. The coal is fed to the machine, powdered and delivered to the furnace without artificial drying.

I am informed this machine was first designed to meet

the needs of a long flaming cheap fuel for cement making and that it has been applied later to various other industries and is reported to have proved highly successful. In construction it differs from the dry pulverizer, inasmuch as neither outside drying, milling nor storage is necessary, and the finished product is delivered direct to the furnace as made. The machine is compact and reduces to a minimum the floor space for installation. Its low price and large capacity are strong features to recommend it for many purposes in which the more massive equipment required for the dry method would not be suitable.

The makers report that this machine has been better tried out than any other form of pulverizer and that results are entirely satisfactory wherever it has been installed. It is offered in stock sizes with capacities varying from 600 lb. to 5000 lb. of pulverized coal per hour. All wearing parts can be duplicated from stock at any time. It is so compact that it may be installed on a locomotive tender, or adjacent to each furnace on steamships, and the fuel fed to the furnace as it is pulverized.

PULVERIZERS IN MANY DIFFERENT SIZES

The smallest size occupies a space 5 ft. long, 2 ft. 6 in. wide and 2 ft. 6 in. high, and has a capacity of 600 lb. of pulverized coal per hour. The large size occupies a space 10 ft. long, 4 ft. wide by 5 ft. high, and has a capacity of 5000 lb. per hour. There are a number of intermediate sizes and capacities between the two quoted.

This machine may be set up either at the front of a furnace, on either side or above, and attended with little labor by the ordinary fireman. Neither dryers, elevators nor storage bins are necessary; the mechanism is dust-tight and self-contained, has few parts to get out of repair, and the principal wearing parts are easily accessible and may be quickly replaced from stock duplicates by any ordinary mechanic.

For manufacturing purposes in the eastern United States the use of pulverized coal has made remarkable strides in the last few years. Firms using it report that it is more efficient and economical than any other fuel they know of, and all are agreed that when it is better known by manufacturers and workmen it will have a wide industrial application.

This method of coal consumption opens a market for the immense lignite deposits of the prairie provinces, which have hitherto been considered of little commercial value, and bids fair to provide a cheap supply of good fuel for those prairie cities now depending on costly Pennsylvania coal. Apparently there is nothing to prevent it from being used for heating apartment and office buildings, at an equal or less cost than oil. It has the added advantage of removing to a great extent the present smoke nuisance. For this purpose the dry methods appear to be most adaptable. Coal could be pulverized at some suitable point in the city and distributed in a manner similar to that employed with the fuel oil now used. The capacity of the smallest plants of this type yet on the market are in excess of the needs of most apartment buildings in Vancouver, and hence a centralized pulverizing plant would be needed. The furnace changes necessary would be small and cost little, and the expense principally confined to the pur-

chase and installation of a small compressor plant to furnish an air supply.

The coal-mine operators of this coast should take up this matter seriously. They are likely to find it an efficient instrument to combat competition from foreign fuel oil, and might be well advised to install it for steaming at their works and for locomotive use on their branch railways. Large coal consumers are naturally shy of experimenting with a fuel they know little about. As a matter of business the mine owners should make the necessary tests at their works and show their customers the benefits to be derived from the application and use of pulverized fuel.

The majority of the coals of British Columbia are of a high volatile character and suitable for making a high-grade powdered fuel. Much has been heard in the last year or two of the great value that is likely to accrue to Canada from the work of a bureau of research, instituted by the Canadian Pacific Ry. at Montreal. If this bureau is as interested as its members would have us believe in the conservation of the resources of the country the fuel question on this road in British Columbia affords them ample chance to prove the worth of the bureau. Surely this is of equal importance and as worthy of attention as the solution of the waste straw problem of the prairies now engaging attention.

Further, take the anomalous case of the Grand Trunk Pacific Ry., a road built with the money of the people of Canada, traversing several coal fields on its route through British Columbia—proved steam coals of high quality—yet for some inexplicable reason using California fuel oil for motive fuel.

Three out of four of the public railways traversing British Columbia use oil as fuel. Even the Esquimalt & Nanaimo Ry., whose route passes through the principal coal fields of Vancouver Island, burns foreign oil for motive power. It is natural to ask if an abundant supply of coal is available and is as cheap as oil, why this preference for a foreign product?

To do justice to this subject the explanation would be so extended as to prolong this paper beyond reasonable limits. In short, it is in part due to the fact that the principal coal mines on the coast are controlled by a rival road, and it is too much to expect any party to encourage its competitor, except under exceptional circumstances. Furthermore, the new railways traverse sparsely populated districts for long distances, and although good coal is found at many points little market for it exists. As a consequence coal mining is not being done. If the new railways wished to use coal for steaming purposes they would be compelled to mine their own fuel. There are also several contributory causes, such as an inability of the new roads to finance coal-mining operations at this time; the fact that it is easier and more convenient to buy oil than mine coal to replace it, and many other considerations.

However, the day is at hand when the industries of this country must rely upon coal fuel. The oil supply becomes more uncertain each year. Modern methods of fractionation have shown that crude oil is too valuable to be used for ordinary fuel purposes. Even if available (unless the price is much lower than at present) it will be unable to compete commercially with coal, more particularly if this is used in the pulverized form.

Byproduct Coking in Great Britain

By M. MEREDITH
Liverpool, England

Since 1900, when coke ovens of the retort type were little in use in Great Britain, a revolution has taken place in the system of coking and large numbers of retort ovens with apparatus for the recovery of byproducts are now in existence. This number furthermore is being constantly added to. The war having stimulated the demand for hydrocarbon explosives, these are now commandeered by the government and the coking apparatus necessary for recovery of the explosives is under the control of the ministry of munitions.

Although the principle of the external heating of the retort oven as originally introduced by Evence Coppée remains the same, considerable modification in detail has been gradually introduced by various builders as the result of experience. The object of these modifications has been chiefly to increase the rapidity of the coking process by the application of more intense heat, and by the heating of the air for combustion. Convenience and economy in operation have also received much attention.

The recovery of byproducts has been greatly developed, and many experiments have been made with more or less success for achieving the "direct" recovery of sulphate of ammonia. One of the most important developments has been the utilization of the surplus gases in internal combustion engines and also in town illumination, metallurgical furnaces and for other manufacturing processes.

Legal Department

WHEN NEGLIGENCE OF EMPLOYER IS PRESUMED—If a mining company's employee was injured through the coming off of a car wheel, negligence of the company in failing to discover and repair the defective condition causing the accident may be inferred from the fact that the wheel was considerably worn and was loose for some time before the accident. (Alabama Supreme Court, *Ross vs. Sloss-Sheffield Co.*, 77 Southern Reporter, 686.)

EVIDENCE IN MINE GAS EXPLOSION CASE—In a suit to recover damages against a coal-mining company on account of death of a miner who was fatally burned in an explosion of gas in the company's mine, it was error for the trial judge to permit a witness, although experienced in mining operations, to give an opinion to the effect that he was satisfied from his examination that the deceased man knew how to use a safety lamp, to rebut plaintiff's claim that the company was negligent in entrusting a safety lamp to decedent. It was for the jury to determine from all the evidence in the case whether the circumstances justified so entrusting decedent with the lamp. Under the Alabama statute which requires that satisfactory evidence must be furnished a mine foreman of a miner's ability to use such a lamp, the foreman is not sole arbiter of the fact. The statute means such evidence as would reasonably satisfy an ordinarily prudent and careful foreman that the miner understood the proper use of such a lamp. But, in any suit wherein there is a dispute as to whether an injured man's own negligence contributed to the accident on account of which he sues, declarations made by himself just after the occurrence of the accident are admissible insofar as they constitute admissions of self-carelessness. (Alabama Supreme Court, *Alverson vs. Little Cahaba Coal Co.*, 77 Southern Reporter, 547.)

Rules for Electric Wiring in Mines

THE West Virginia Engineering Co., of Charleston, W. Va., is promulgating the rules for electric wiring given below. Although it is difficult to lay down specific instructions in all instances, the rules here given cover the vast majority of cases and may well serve at least as a groundwork upon which, if necessary, more elaborate and detailed rules may be built up.

1. All power circuit mine wiring must be done with approved mine type insulators and pins, 20 ft. to 25 ft. apart where the roof is low, and where the roof is sufficiently high to permit it, 30 ft. to 35 ft. apart.

2. One wire only may be placed on an insulator, securely tied with at least five turns of No. 4 copper tie wire on each side of the insulator.

3. Where conditions are such as not to permit the hanging of wire on the roof, cross timbers not smaller than 3 x 4 in. must be used, placing them so as to bring all insulators as near as possible to one height.

4. The cold or negative wire must be put up and maintained with the same care as the positive, and in no instance thrown down along the entry or placed underneath the road or track. All wires when erected must be put up with care and pulled up snug and taut, so as to remove all kinks and slack. They must not be allowed to touch slate, coal or timber, but must be erected and maintained at a safe distance therefrom and not less than 10 in. apart. The practice of wedging insulators between wires or between wire and coal, etc., should not be followed.

5. Butt entries must be wired with the same care as face and main entries and provided with two S. P. switches of not less than 200 amp. capacity. No breakers or fuses will be permitted at these points.

6. Where face entry wires leave main line, switches should also be used.

7. Where entries advance beyond the limit of the machine cable, No. 4 copper wire should be used for a distance of about 600 ft. or the length of a longer roll of wire. This wire is to be replaced with wire of larger size as soon as the entry has advanced sufficiently to allow the use of a complete coil without cutting.

8. Under no conditions are live coils to remain hanging at the head of entries or at the ends of any wires, and a No. 4 wire must not be employed for a greater distance than 800 ft., but must be replaced promptly with wire of larger size.

9. No rooms or working places are to be wired.

10. Entries must not be wired beyond the last breakthrough.

11. Power circuits should not be permitted in return air courses.

12. The amount of wire in mines must be minimized as much as possible, and where circuits are no longer necessary the wire should be disconnected at once and removed as soon as possible.

13. The practice of allowing wiring to remain in old breakthroughs, cross-cuts, etc., should not be permitted, and old tie wire, broken bonds, scrap wire, old cables and coils of wire must be gathered up and kept in an orderly manner under lock and key where it may not be accessible to everyone. All scrap wire, etc., must be disposed of promptly and not allowed to accumulate in quantity.

14. The terminal ends of all large wires must be securely anchored and thoroughly insulated with a turnbuckle and strain insulator. Dead ending on wood crosspieces or posts without the use of an insulator should not be permitted.

15. Whenever there is danger of a wire being touched, as for example where it crosses an entry, the roof should be trenched at least 10 in. deep and the wire securely placed on insulators. The trench should then be covered by 1-in. boards fastened to wooden pegs driven into the roof. The wires must not touch the board but must be thoroughly insulated and well separated from it.

16. The use of jumpers should not be permitted.

17. All wire joints 2/0 or larger must be made with brass sleeves thoroughly and neatly soldered. For smaller sizes use Dossart "A" or regular Western Union joints with no less than six turns on each and thoroughly soldered.

18. Where wires go through wooden or brick brattice work or other partitions, they must be thoroughly protected with porcelain tubes. The tubes, if in wood partitions, must be held in place with tape; if in brick-work, they must be cemented so that they cannot be moved.

19. Where partitions, brattices, etc., are built after wires have been erected, split tubes must be used to avoid the cutting of wires.

20. In wiring entries where a metallic circuit is used, care must be taken that the positive or hot wire is always placed next to the rib, the negative or cold wire being placed 10 in. on the outside of the hot wire.

21. The hanging of wires on nails, whether wire is insulated or not, should

not be permitted, and wood cap pieces, etc., must not under any circumstances be used to keep wire away from the ribs.

Trolley Wire and Bonding

1. Trolley wire may be suspended inside the mine on hangers, lag screwed to cross timbers, or where the roof will permit, from expansion bolts fastened to the roof.

2. All new trolley will be of the standard grooved or figure 8 pattern; care must be taken that no kinks, sharp turns or dents from come-alongs are made in it.

3. The center of each hanger should be plumbed 7 in. outside the outer edge of the rail. Hangers should be placed about 20 ft. apart on straight entries in low coal and 35 ft. apart in high coal. Considerable latitude will have to be allowed, as no specific rule can be made for distance apart of hangers, but the above is a fair average when wire is erected and maintained properly. On curves the distance should be 8 ft. to 10 ft. between hangers.

4. Barn hangers are provided with four holes, while two holes diametrically opposite are sufficient. Use 1/2 x 2 1/2-in. gimlet point lag screws, drilling holes for same with 3/8-in. twist drill. Do not use track spikes or nails for fastening hanger bodies to timbers.

5. Frogs should be placed 2 1/2 ft. in advance of point of lath and held in horizontal position by properly placing hangers on line near frogs.

6. Frogs must be placed at each point where branches leave main trolley and when properly placed will not necessitate the holding of pole when passing over frog at ordinary speeds.

7. Automatic trolley switch and signal lights must be placed at all partings where mules will pass under the trolley. Automatic switches are not expected to sustain severe stresses and should be relieved of such by proper disposition of strain ears and hangers.

8. The ends of trolley wire must be securely anchored and thoroughly insulated with turnbuckle and strain insulator. A three-bolt galvanized clamp should be used for fastening the end of the wire when it is bent on itself through the strain insulator.

9. Care must be taken that the trolley wire clears the roof, so that the trolley wheel will not touch the roof at any time.

10. Where feeders are necessary they must be erected the same as main lines and tapped in at proper intervals by means of feeder ears. Hooking a jumper around an ordinary hanger should not be allowed.

11. At the end of the motor road where machine lines ground to rail or at the point where the rail circuit returns to the plant, it is well to use several bonded wires leading to return and to bond each individual wire into the rail in more than one hole, also to provide a cross bond at this point.

12. Bond both sides of track, using pin expanded or compressed terminal bonds.

13. Be careful to drill holes exact size, using nothing other than a twist drill.

14. Bonds must be placed on inside of rails and extended beyond the fishplates to such lengths as will allow removal of the fishplates without disturbing the bond.

15. Cross bond every fifth rail, making bond of sufficient length that it may be bent down below the top of the ties so as not to be interfered with.

16. Where rails are shipped with bond holes already drilled, ream out these holes $\frac{1}{8}$ in. and use a bond the proper size of terminal.

17. All switches must be cross bonded just back of the frog, all four rails being connected.

18. When drilling bond holes do not use oil as this acts as an insulator to a certain extent and does not allow the best contact.

19. The following length of bonds should be used for different weights of rails:

Weight of Rail, Lb.	Length of Splice Bar, In.	Length of Bond, In.
30 to 35	16 $\frac{1}{2}$	22
40 to 45	20	26
50-55-60	24	30

Cross bonds should be 6 in. longer than the track gage.

Mine Lighting

1. Where it is necessary to wire partings, slopes, curves, pump houses, etc.,

use receptacle and No. 12 triple braid, weatherproof wire and No. 4 porcelain knobs.

2. No rosettes, snap switches or ordinary sockets should be used in the interior of the mine.

3. No switches or fuses will be required. Where a large number of lights are used fuses and switches can be used to advantage.

4. The practice of hooking ends of light wires over power circuits should be discontinued and connections made in such a manner that vibration of the line will not form arcs, burning the large wire. Screw connections must be used.

5. Where it is necessary to turn lights on and off frequently in interior of mine, knife switches should be used.

Substitutes for Coal

By FRANK HALL
Harrisburg, Penn.

THE incalculable value of coal as the source of power in the industrial world, and the source of comfort in domestic life, gives rise periodically to the query, How long will the coal supply last? and the natural corollary, Can any substitute be found when the coal supply is exhausted? The answer to both questions is indeterminate and unsatisfactory. The vast unmined deposits of coal, however, give assurance of a plentiful supply of fuel for at least 100 years to come, even with a constantly growing demand.

In the United States, including Alaska, the deposits are placed at 4,231,352,000,000 tons, or half of the total of the world. A great part of the deposits, however, lie below a practical mining depth. In Pennsylvania, the unmined anthracite deposits are by one authority estimated at 10,638,902,809 tons, half of which may be available, or 5,319,415,404 tons. Another computation shows that 6,512,167,703 tons are available. Estimating the annual production at 70,000,000 tons, the duration of this industry in one case would be about 73 and in the other about 93 years.

In the bituminous region, according to the latest estimate of the Federal Government, there still remain about 109,000,000,000 tons unmined, or an amount sufficient to continue the present rate of production for 500 years. This estimate, however, is deemed extravagant by the best informed mining men. The 26 counties of Pennsylvania now being exploited comprise practically all of the coal-bearing measures of the region, and from some of them the greater part of the coal has already been extracted. It is probably nearer the mark to say that another hundred years at the present rate of production will no doubt bring to the point of exhaustion the rapidly diminishing deposits of the bituminous region of the state.

If the estimates given above can be accepted as reliable, the tremendous quantity of reserve coal at the disposal of future generations should effectually dispel for many years to come any apprehension as to the possibility of distress resulting from a lack of fuel. It must be borne in mind, however, that the most trustworthy estimates are after all merely estimates, and

the actual deposits when exploited may prove disappointing in volume.

The extended and rapid increase in consumption must also be considered. Almost incredible has been the growth of the coal industry in recent years. One authority declares that if the acceleration continues, the coal supply in the United States will probably not last 100 years. It may be accepted, however, as highly improbable that the increase will continue indefinitely at the same ratio in the future as in the past.

After considering the subject from various angles and comparing the many estimates of the coal deposits still unmined and the probable consumption in the future, it would seem that at least for the next 200 years the coal supply in the United States will be ample for the needs of the population.

These conditions make imperative the ultimate finding of a substitute for coal, but what it will be, its nature or character, no one can predict. There are no natural substitutes for coal to be found in Pennsylvania, but in some of the Northeastern states, as well as those near the Great Lakes and also along the South Atlantic coast, there are large deposits of partially decomposed vegetable matter commonly designated as peat, which has a fuel value per pound equal to about one-half of the value of the higher grade coals and nearly equal to the lower grade coals or lignites.

This material can, with proper treatment, be made to serve as fuel, but the process of preparation is rather complicated and expensive. The product when ready for the market is really a manufactured article. Peat has been used for centuries in Europe as a domestic fuel, but it has only been within the past decade that it has reached any importance as a fuel for power plants in competition with coal and lignite.

The manufactured substitutes for coal in this country, so far, are briquets or boulets made from the refuse of anthracite or mixtures of anthracite and bituminous, bituminous slack or sub-bituminous or lignite. Some of these manufactured products are gradually winning favor with the public and may in time, when more perfectly made, prove commercially successful and be a

real factor in conserving the coal deposits. With the increasing demand for fuel, especially of the better class for domestic use, in connection with the increasing cost of labor both in the mines and in transportation, the growth of the briquet industry will no doubt be rapid and substantial.

We have not as yet reached the time, however, when the briqueting of all fuels will prove profitable. It is almost out of the question to briquet good coking coals for either industrial or domestic purposes, for the reason that the briqueting of these coals does not change their nature. If ordinary binder is used, it may increase their smoke-producing qualities during combustion, so that fuels of this nature can be better treated by carbonization or coking, especially if the byproducts are saved.

The best field for this industry is in the briqueting of fuels possessing poor or no coking qualities—the slack and fine coal at the mines and shipping centers, which is practically useless or of little value for any other purpose. Of this large quantities are produced in many parts of the country and are either left at the mines or sold at a price considerably below the cost of production. This class of fuel can be converted, if smokeless in its natural state, into an entirely smokeless and odorless product by the use of proper binders. Even fuels containing a considerable percentage of volatile matter, which are more or less objectionable for domestic use in their natural state, can be converted into briquets that will be superior to the prepared and screened sizes of the natural product, from the dust

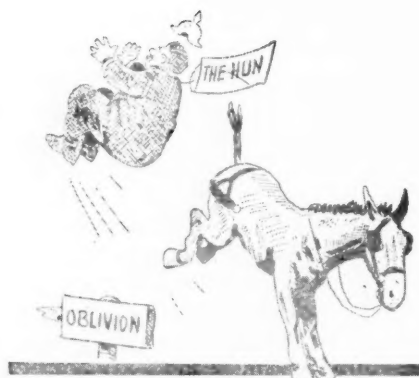
or breakage of which they are made. The latest product now on the market to bid for favor as a coal substitute is what is called carbocoal, a fuel produced from bituminous coal by a method of distillation at relatively low temperatures in which there is simultaneously obtained a sufficient quantity of valuable byproducts to largely offset the cost of converting the raw coal into a refined, smokeless product which will substitute satisfactorily for anthracite. Carbocoal is claimed to be a near approach to a perfect fuel. It is said to be smokeless, ignites with comparative ease, burns freely and completely under all draft conditions and is dense, dustless, clean and uniform in size and quality. It remains to be seen what place this highly eulogized fuel will take in comparison with bituminous and anthracite.

Substitutes for coal in the way of briquets and boulets, no matter how satisfactory they may be as a domestic or power fuel, are in the last analysis merely substitutions of coal in one form for coal in another, the basis of all the manufactured fuels of this type thus far placed on the market being coal. Hence they serve the purpose only of conserving in a small degree the raw grades of fuel. If the coal supply should become exhausted, the many forms of substitutes now clamoring for public approval would also cease to exist.

What is wanted, and what the scientific thought of the world must devise, is a genuine substitute for coal, one that can be manufactured independent of coal as a chief ingredient. Unless this is done, the world will some day face a real and permanent heat famine, the horrors of which can scarcely be imagined.

Goodbye, old mule!
It's mighty tough to see you go,
But Uncle Sam—who ought to know—
Has found he needs you over there
To help the nation do its share.
You'll probably be hauling guns
To blow the brain-pans off the Huns.
Well, show them that you're not a fool—
Goodbye, old mule!

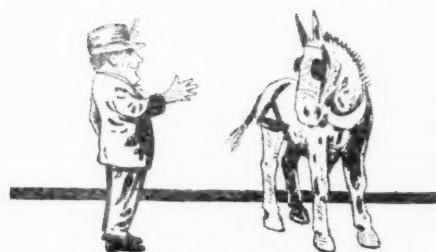
Goodbye, old top!
I used to rave and swear at you
Until the very air was blue,
And every second word I spoke
Was wreathed in clouds of sulphur smoke.
I reckon, after you are gone,
And I've no one to practice on,
My cussing days will have to stop.
Goodbye, old top!



Knock a Hundred Boches Out

DRAFTED!

BY RUFUS T. STROHM

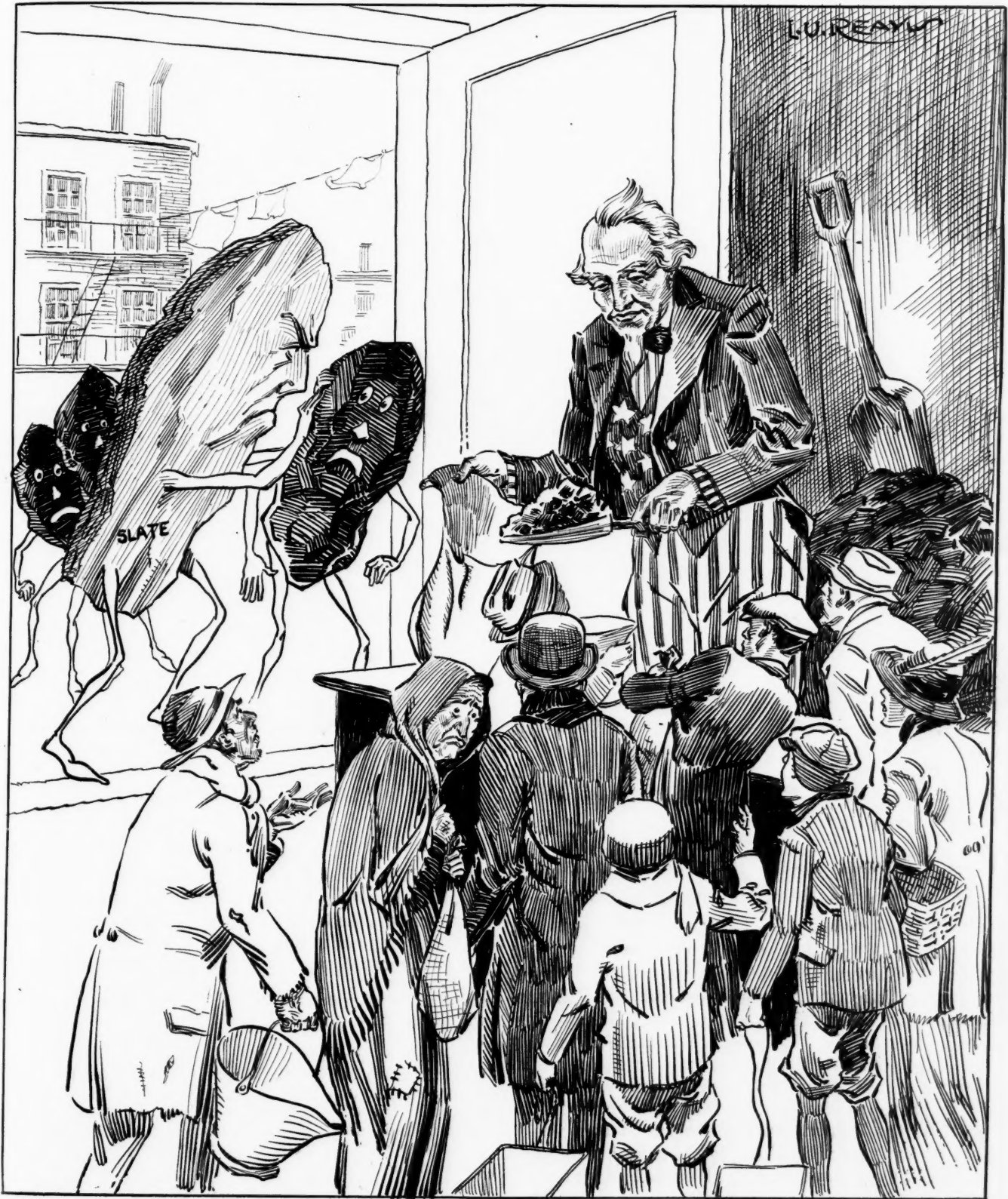


Goodbye, Old Mule

Goodbye, old pal!
You needn't have a pang of fear
That Fritz will finish your career.
No missiles made of steel or lead
Can ever dent your thick old head.
If it could yield to any blow,
Why, I'd have cracked it long ago.
You'll always have a strong morale.
Goodbye, old pal!

Goodbye, old scout!
I've put the quartermaster hep
That you've a fierce, unlovely rep
For impish tricks of every style
That make a mine mule's life worth while.
So, if they mix you in the fray,
Put both those frisky heels in play
And knock a hundred boches out.
Goodbye, old scout!

Every Pound of Slate Keeps a Pound of Coal Out of the Market



The Railroad Administration can only supply us with a few cars. Let us do our best to keep slate from taking up the space that should be

occupied by coal. Otherwise, this winter Uncle Sam will have only a small poke of coal for each person, and all will go cold.



Weekly Production Statistics

Production of bituminous coal during the week ended May 18 bids fair to pass the 12,000,000-ton mark. Telegraphic advices to the Fuel Administration indicate that that week will surpass the production performance of any week during the twelve months preceding.

Production increased during the week ended May 11, when 11,806,000 tons were mined. This is a slightly better showing than was made during the record week ended April 27. Beehive coke production during the week ended May 11 was 655,000 tons, which shows a slight increase over production during the week preceding. Byproduct coke production was 536,544 tons. Production was cut somewhat by a labor shortage at the Bethlehem steel plant at Northampton and at the Cambria steel plant at Johnstown.

Anthracite forwardings showed a decrease of more than 5 per cent. over the week preceding. During the week ended May 11 they were 38,314 cars.

During the week ended May 4, the coal mines of the United States were operated at 75.6 per cent. of their full-time capacity. The loss was distributed as follows: Car shortage, 13.1 per cent.; labor shortage and strike, 5.4 per cent.; mine disability, 2.9 per cent.; no market, 0.9 per cent.; other causes, 2.1 per cent.

The figures given above are those compiled by C. E. Leshner, the geologist in charge of coal statistics for the United States Geological Survey.

Fuel Administration Takes Over Statistical Bureaus Dropped by McAdoo

To continue the collection of absolutely essential figures, the Fuel Administration, at an expense of \$3000 per month, has been forced to continue the Ohio Bureau of Coal Statistics and the statistical end of the Illinois-Indiana Coal Traffic Bureau and the St. Louis Coal Traffic Bureau. The Railroad Administration recently cut off the appropriation for the maintenance of statistical bureaus. It is probable that the Fuel Administration will have to reestablish other of these bureaus. The action of the Railroad Administration is being criticized by some from the fact that no actual saving will be made as the Government will have to pay for the collection of these figures. It will have the effect, of course, of making a better financial showing for the railroads.

The bureau which has been charged with the collection of statistics regarding coal moving to tidewater has been taken over by the Tidewater Coal Exchange.

New Prices for Arkansas Anthracite

Prices for Arkansas anthracite at the Bernice mines at Russellville and at the Spadra mines at Spadra have been announced by the Fuel Administration as follows:

Bernice Mines—Grate, \$7.75; egg, \$8; stove, \$8.75; No. 4 nut, \$8.75; pea, \$6.75; buckwheat, \$2.85; slack, \$2.50.

Spadra Mines—Grate, \$7.25; egg, \$7.25; No. 4 nut, \$7.75; pea, \$5.25; slack, \$2.50.

The prices are subject to a reduction of 75c. during May; 60c. in June; 45c. in July; 30c. in August and 15c. in September.

May Investigate Shortage of Coal Cars

An investigation of the shortage of coal cars probably will be made by the Senate Committee on Interstate Commerce. The Fuel Administration has been asked to furnish the committee with such data as it may have which have a bearing on car shortage. It is not the intention of the Senate committee to open up an extended investigation. It hopes to get at the high points of the situation and take prompt action in an effort to better conditions.

War Industries Get Good Coke Supply

War industries are better supplied with coke at present than at any time since last October. This assertion was made by Dr. Garfield in a letter to coke operators thanking them for their cooperation in increasing the movement of coke to furnaces and foundries. An extract from the letter is as follows:

It is not enough merely to maintain the present movement of coke. We must work still harder to take care of the constantly increasing demands and to establish conditions which will enable us to avoid in the future any slowing down of war industries.

We all recognize that the most serious difficulty has been lack of transportation facilities. There has been possibly more disposition on the part of some to find fault with the railroads and with railroad men than to cooperate with them in their efforts to remedy conditions. Permanent improvement may be brought about by cooperation, not by fault finding.

There have been many serious wastes of transportation facilities which, if eliminated, would make it possible to increase materially the movement of coke. Much has been done along these lines, but there is still great room for improvement. Unnecessarily long hauls should be eliminated. Coke operators should endeavor to dispose of their coke in the district to which such coke can be most readily moved. Cross hauls should be avoided where possible.

To Circumvent "Commercial Bribery"

In order to reach what the Federal Trade Commission calls "commercial bribery," Representative Sims, chairman of the Interstate and Foreign Commerce Committee of the House of Representatives, has introduced a bill which provides for a fine of not more than \$2000 and imprisonment for not more than two years for any "person, firm or corporation engaged in interstate or foreign commerce or in any competition with other persons thus engaged to, personally, through an agent, attorney, servant or employee, or by the use of the mails or otherwise, give, offer, promise or loan to any such employee or the employee of a customer or prospective customer, any money or other thing of value for himself."

Getting Ready for "Coal Week"

Every effort is being made by the Fuel Administration to make the week beginning June 3 one of notable accomplishments in the way of securing orders for coal. In view of the important advantage to producers and dealers, if they have accurate knowledge of requirements, Fuel Administration officials feel that this is an important step in relieving next winter's situation. It is expected that state and municipal authorities will cooperate actively in the drive which will continue throughout the week. Women's clubs will cooperate and will be in charge of a house-to-house canvass. Four-minute men will appear in theaters and picture shows. The drive has as its object not only the securing of orders from the domestic consumers, but from all industries as well.

Brief Washington Notes

Virginia operators have protested to the Interstate Commerce Commission against the granting of the request of the Chesapeake & Ohio R.R. to increase coal rates.

Malcolm G. Chance, of Providence, R. I., has been appointed Fuel Administrator for Rhode Island. He succeeds George H. Holmes, who was forced to resign by the pressure of personal business.

Awaiting such time as the Director General of Railroads may find it possible to go personally into the matter, the railroad fuel situation, during the last week, remained entirely without change.

Provision probably will be made in the near future to insure larger movement of coal to North and South Carolina. The operation of the zone system in providing large quantities of fuel to tidewater ports has absorbed a considerable portion of the supply which would normally have moved into the Carolinas.

Government coal en route to an army post can not be diverted by state fuel administrators, according to an opinion of the Judge Advocate General of the Army. Such officials, he says, have no jurisdiction with respect to such property and railroads should disregard such orders.

Dr. Garfield's efforts to persuade A. H. Wiggin to continue as state fuel inspector for New York have been unsuccessful, and Mr. Wiggin's resignation has been accepted. He will retain his place, however, as chairman of the Fuel Administration's advisory board for the State of New York.

The Fiend's Soliloquy

BY GEORGE M. LANTZ
New Straightsville, Ohio

□

I AM THE PRINCE OF DEVILS, one of the Great Powers of the World.

Kings, judges, statesmen, warriors are at my command. Yea, there be ministers, teachers, doctors and even editors who dare not oppose me.

But among these I work only for pastime; my real mission is to enslave the producers of the world's necessities—to pervert the men who till the fields, who build bridges, who tunnel below the surface of the earth.

Where strong men, pioneers, are needed, there I go; I beckon for the saloon, the gambling den, the brothel, and retard the establishment of the church, the school and the home.

I sow poverty, insanity and disease and reap broken bodies, vacant minds and deformed babies.

I poison the brains of my victims, steal their strength, blunt their perceptions and then send them reeling into the mine or the factory. There is a slight miscalculation, a fall of roof, a misstep, and they are mine.

Men gather about the mangled remains and speak in awed whispers about unavoidable accidents and acts of God.

The Prince of Darkness Laughs!

An Act of God Indeed!

I promise men that which is not within my gift—wealth, power, courage, beauty. I introduce men to crime and immorality, and when they have been disillusioned I promise forgetfulness.

I lead men to the Chasm of Destruction, and when they have drained the dregs of misery and pain, with my foot I push the miserable fools across the brink.

I destroy all that is noble in men. All that they might become, all their possible achievements, I hang as trophies at my belt. Their savings, their homes, their families, their souls are offered up as sacrifices before me.

I direct those who prey upon their daughters; I steal the milk from their doorsteps; I strangle Hope in the breasts of wives and mothers, and in its stead I implant Anguish and Despair; children shudder at my approach. In my moments of calm I tremble at my own iniquity. Some day I will be banished from the earth; the beasts that I have created will become men again. In that day the most exalted throne in Hell will be my seat, for my followers will outnumber all others.

□

I AM ALCOHOL

EDITORIALS

Suppress or Reform Alien Papers?

THERE are lots of papers published in this country in the languages used almost exclusively by our enemies. Many of them are admirable exponents of real American principles. But, whether they are good or bad or merely indifferent, we do ill to suppress a single one of them. But this we may do with profit—we may modify their policy to accord with the national purpose.

If their editors prove recalcitrant we can put others in their places who are more to our liking. The man who reads a paper in an enemy language should not be permitted to absorb from it enemy-alien Kultur, certainly not during the war. We should not interfere with the freedom of our loyal press, but the right to be fed with a foreign Kultur in a foreign language during a war which is trying our national existence may appropriately be denied.

But we may go further even than just suggested. We can require those editors we retain to publish articles and editorials written by the Government laying down the national viewpoint, not particularly excoriating the enemy, but placing the facts before the readers of these papers. We can urge in those journals the need that all foreigners learn the language of this country to take the place of the enemy tongue.

And it does not follow that the papers will not be read. We fume cloudily about the enemy aliens, but for the most part they know that they ought to be with us, and really would be with us, if they could only gently root out their preference and predilections for their fatherland.

It is no small matter this regeneration, but careful propaganda in the alien tongue would eventually do the work and do it better than even our national journals could perform it if the enemy alien could read them, for during the heat of a war our native press naturally does not spare the feelings of those with whom we are contending. Of course, some would refuse to read the enemy-alien press after it had been thus renovated, but they would certainly not read our papers if we suppressed theirs, and when we suppress the enemy-alien newspapers we prevent the kindly and the unfriendly enemy alien alike from reading about the war, and we lose the opportunity of inculcating in the friendly enemy alien the spirit of Americanism.

Open an English School for Foreigners

IT HAS been the custom to inveigh against the foreigner because he uses the language of his native land and because he foregathers only with those of his own race and language. But he is not wholly to blame. How can he learn English with the few facilities that are offered him in most towns and villages? There is no one to teach him English. How can he associate with others when he has not had a chance to learn the language that they speak?

A large movement is being initiated to induce the foreigner to learn to speak and read English. It will utterly fail unless the opportunities for instruction are offered. There is, and of this we may be proud, no rooted objection to the English language, such as exists against the German language in Poland. The people who come here are no more prejudiced against English than the Welsh people were prejudiced against it; and we know that Welsh has almost entirely died out, though no one wished it so unkind a fate. The immigrant wants to learn our tongue. He feels like a deaf-and-dumb man until he does, for he is disadvantaged in all his operations till he can talk to those with whom he has to work. It is only a small percentage who use their "No forestay" for purposes of guile.

The foreigners, both men and women, are willing to go to school and learn English. The language of this country, fortunately, has not been made hateful to them by unfair treatment and jealous discrimination. There are countries where years of suspicion and traditional hatreds have made all attempts to introduce a new language hateful.

In such cases an organized opposition exists to the introduction of the language of the state. We may gratefully declare that it is not so here, and if we will give the foreigner half a chance he will do his best to rattle off English with the rest of us, at his work, on the street and in his home.

That there is no objection to the use of the English language is shown by the readiness with which the sons of immigrants accept it. Only on the farms will you find an immigrant's son who can speak his father's language with facility. When the boys mingle morning, noon and night with young folk no other language than English can they roll glibly off their tongues.

A school for foreigners is a wonderful investment for the operator. The men working for him will always be able to understand the manager and the foreman. There will be less dissatisfaction and lost motion. Americanized men can be put in good houses with the assurance that the homes will not be spoiled. When notices are posted the Americanized foreigners will be able to read them. They will do it for practice in the language if for no other purpose.

With training in English, accidents will be less numerous; the labor turnover will be reduced; strikes will be less frequent. What is more, there will be less need for strikes. The worst of all these troubles, the longest and most destructive, are those caused by mine workers who cannot be argued with and so cannot see any point of view but that of the agitator of their own race who happens to have their ear. At any mine the best foreigner of all those who come from a country where English is not spoken is apt to be the one who can speak English best. Few patriotic duties are clearer than this: To put plans in operation at once to establish schools for teaching English in every mine village.

Alaska Is Still Hermetically Sealed

NO ONE expected that the spoon-feeding methods of the United States Government would ever develop a large and thriving coal industry in Alaska. Men will go to the remotest portions of the earth to make a fortune, as the history of gold mining well shows. But granted that it takes more capital, attention and risk to make a small profit in Alaska than, for example, in Illinois, we shall unquestionably find the operator going to Illinois and not to Alaska. He will seek a field where conditions are not so rigorous, where so many strings are not tied to his activities and where there are not so many indeterminate factors to meet.

The Government has built a railroad from Anchorage, a tide-water port, to the Matanuska fields. It has opened the coal fields to the public in a carefully regulated degree. Coal has been arriving at Anchorage, but the price is discouraging. Instead of that price being \$5 or \$6 per ton, it has stood around \$11 at the point of loading, before any shipping and unloading charges have been added. There are large deposits of coal in the Matanuska field, but private capital is not content to risk itself under the leasing provisions laid down by the Federal Government. For this reason the great field is being developed but sparingly, and Alaska is still importing British Columbia coal, though that province of the great Dominion has dire need for all it produces. There is every indication that it will soon cease exporting coal to the north. Thus there will soon be a great need for coal in Alaska, despite the fact that the territory's coal resources are greater than those of the State of Pennsylvania.

Coal at \$11 per ton at Anchorage cannot be delivered at Seward, Valdez or Cordova, the towns nearest the coal fields, at a price within \$2 or \$3 per ton of the present price of imported coal. Therefore, unless some vital changes are made in the law under which these fields are being developed, and unless there are some inducements offered to capital to develop these fields upon a commercial basis, with a reasonable maximum price fixed for the product, the expenditure of \$35,000,000 for the Government railroad is practically wasted, so far as providing fuel to the territory and the Pacific Coast is concerned. Yet the coal is badly needed there at this time.

If the Government desires to cheapen fuel in the territory and produce tonnage for its railroad, it should take down the bars and make it possible for private enterprise to develop the fields. Cheaper fuel is needed for the comfort and convenience of the people of Alaska, for furnishing the steam used in the mining of frozen ground, for the general development of Alaska and for industrial purposes all along the Pacific coast.

The urgency of these many needs make changes in the leasing law imperative. The present laws are not liberal enough; they do not permit a man to purchase the coal land, nor provide area enough to interest a rich man in opening a mine. The rental is too high for the poor man in view of the risk of the venture. There is greater risk in Alaska than in probably any other coal field. All things considered, the restrictions are such that the requisite capital cannot be secured to make the heavy expenditures found necessary in the development of these far northern coal-mine properties.

Who Are Free in the Land of the Free?

FOR GOOD and sufficient reasons, the mine worker in most fields is fined if he will not, on demand, sell his labor to the operator at the specified rate. In many states he is even jailed if he will not sell his labor to anyone. But these are war times, and such provisions are excellent.

For good and sufficient reasons, the operator in most fields is fined if he will not buy the mine workers' labor at the specified rate. It is well understood that if, for insufficient reason, he refuses to operate his mine, it is quite apt to be taken from him. These are war times, and no one can complain.

Who, then, is free in the land of the free? Why, the Railroad Administration. It has been refusing to buy the product of the operator and miner unless it can get its own terms. Despite the fact that the Government has named a fair price, the Railroad Administration regards itself as empowered to buy or to refrain from buying as it pleases. In the winter, when it needs coal, it can compel a sale; in the summer, when it is not in immediate need of coal, it can delay purchasing it for the winter. That is a wonderfully advantageous position to occupy, and the Railroad Administration is making the most of it.

Beside the Railroad Administration there are the free manufacturers of nonessentials and the free purchasers of the same. They buy and sell nonessential products at their pleasure, but they are coming gradually within the net; they are much less free than they were. As far as coal is concerned, the manufacturers of nonessentials are, beyond cavil, the most ardent of purchasers. They cannot commandeer coal and they tremble for fear that later on they may not be allowed to buy it at all. So they come readily into the market, are anxious to store coal, and would even buy railroad cars in which to haul it if the possession of cars would insure them a coal supply.

The Railroad Administration alone is indifferent. When, by the Administration's refusal to buy, a mine worker is laid idle, shall we fine it a dollar a day, payable to the Red Cross? Some such course would seem quite logical and advantageous, even though the public would have to meet the burden; for the Railroad Administration does not like unnecessary expenses because they cause it to make a bad showing. As it is not generous to the Red Cross, like some of our "soulless" corporations, a fine levied on it for the benefit of the Red Cross would rectify that matter and, furthermore, would put it on the same level in the conduct of its operations as the mine worker and operator, who are required to pay the Red Cross a dollar as often as they, in a moment of spleen, refuse to shoulder their reciprocal burdens and so fail to perform their whole duty in this national emergency.

We do not like to speak so plainly about the Railroad Administration's derelictions. We are sure its purposes are as excellent as that of any other organization. But we would like it for a while to look at the field of its activities from another hill and see its responsibilities with the light at a different angle. The interest of the railroads is not inimical to that of the public, and the public's interest is clearly not to be found in any delay in the buying of the coal for the coming winter.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

The anthracite mine workers seem to be losing the high sense of obligation that has impelled them hitherto to work unremittingly and to "shell out" generously in the Liberty Bond campaign. The specter of the winter's shortage of anthracite ceases to haunt them as it should. Let them never for one moment forget that the long lines of waiting women and shivering children will form again if they relax their efforts.

A strike of 700 men and boys at the Maxwell No. 20 colliery of the Lehigh and Wilkes-Barre Coal Co. at Asnley, Penn., caused a complete shut-down of the works. The union called a meeting on May 16 and there was a tumultuous session, the officials of the union vigorously condemning the strike. The men eventually voted to return to work May 17 and to let their grievance be settled by the regular grievance committee.

The quarrel between the men and the company relates to an interpretation of the contract regarding yardage. If they are right in their contention that a larger allowance is due them, they can get the difference for the past as well as for the future from the commission appointed to adjudicate such grievances.

A button strike occurred at No. 5 colliery of the Delaware and Hudson Co., at Larksville, just outside Wilkes-Barre, Penn., on May 17. The trouble was caused by several men objecting to the payment of 50c. instead of 25c. a month to the union. It shows how strong the support of the union is in Luzerne County that the action of these men resulted in a strike. In some parts of the southern anthracite field whole unions are opposed to the change in dues, whereas in this colliery in the northern field a large majority is ready to resent by a strike any attempt to avoid payment of the higher poll tax. The strike laid idle 1200 employees and entailed a loss to the market of at least 900 cars. It is unnecessary to again condemn these button strikes as violative of contracts and as a restraining hand laid on the war activities of the nation.

In the rest of the country the news largely relates to Red Cross activity. The mine worker is being slowly educated to saving, while giving is an atmosphere in which he has long lived. The Red Cross consequently has a marvelous appeal to him, as a special article on this subject appearing in this issue will fully attest.

At the time this review is written the strike in the Huntingdon and Broad Top region is still continuing. It must be conceded that though the coal of that region is a high grade low volatile fuel the field is not an important factor in the coal industry. Consequently the fire of discontent will probably be allowed to burn itself out. The union is not backing the mine workers, for they are violating their contract. The Fuel Administration, it need not be said, is not favorable to the strike method of settling grievances.

No one is worrying about the situation. The cars which should go to the Huntingdon and Broad Top region will afford a pleasing addition to the scant supply of cars elsewhere. Profits are not high in the Broad Top field, and as a result operators will be content to have their mines remain idle. On the whole the only unsatisfied people will be the idle miners. Left alone and unnoticed in their quiet hill country they will begin to realize that after all the lack of their tonnage will not bring the country to their feet.

If the nation never heard of the miners of that region any more, the war would be just as effectively waged against Germany, and some men now idle would be making a better wage than they are today, and out of their plenitude doubtless they would be managing to save many dollars for Liberty Bonds and the Red Cross.

Cost-Plus Factories Filch Miners

Now that the dissatisfaction about the wage scale is removed the mine workers of Alabama are expected to work more regularly. The increase became effective May 15. The situation is nevertheless far from encouraging. An increase of wage may well make for contentment, a contentment such as makes some men, at least for a time, work harder, but also of a kind that makes some men content to work only a few hours where they worked a full day before.

James Bowron, president of the Gulf States Co., in an open letter, explains why Alabama producers cannot provide more iron and steel, but much of what he says about the iron industry of Alabama would not be any less apt if applied to the coal industry of the same state and region, and much of his statement applies specifically to the mining conditions at coal-producing plants.

"We are not in a position today to take any action toward an increased output. We could furnish the money for it, the good will and the executive ability, but there our power ends.

"We need an adequate supply of raw material and a conservation of our men. Raw material of every description is scarce in this district and what is produced is of an inferior quality. Many miners, both in ore and coal mines, are openly indifferent to the production of clean ore and coal. The volume of slate and dirt which goes through the coke ovens and the blast furnaces of the district makes necessary the use of additional limestone to flux the mix and additional coke to fuse it. In this manner the impurities in the coal and ore decrease the production of pig iron and increase the output of slag.

"On account of their high wages, many of the miners do not care for continuous work and many others, of course, have accepted the call of their country and have gone into military service. Men are scarce and in some cases the efficiency of those remaining is reduced.

"In addition to this, the pirating of labor seriously interferes with industry. There is hardly an industrial operation in this district that is not daily attacked by labor agents who try to take the men away to other places. The contractors, particularly the DuPont people, are building nitrate or powder plants for the Government on the cost-plus system and are offering any wages that may be necessary to induce the men to leave their present employments, and I submit that this system should be sternly controlled by the Government, as every man taken from one job to another at the expense of the Government is adding to costs at both ends and on the whole decreasing the efficiency of the nation's work."

Colorado Plan for West Virginia

To secure the fullest coöperation between operators and miners, and to remove all possible causes of friction, coal operators of central and northern West Virginia attended a meeting held at Fairmont, May 15, at the offices of the Federal Fuel Administrator for West Virginia. They, then and there, agreed to adopt what is known as the Colorado Industrial Plan of 1916 and this the miners will doubtless readily indorse. Each individual mining plant, under the plan, is to permit its employees to form an organization which will appoint a committee to meet with representatives of the company whenever any grievance is in controversy. Should such committees fail to reach an agreement the matter in controversy would then be referred to a central umpire.

About 69 different operations were represented at the meeting, the large attendance being due to the importance,

to the region in the northern part of the state, hitherto unorganized, of the new policy, the initiative in its adoption being taken by the Consolidation Coal Co. It is said that fully 95 per cent. of the tonnage of the Fairmont region was represented at the meeting.

Among the companies represented were the Consolidation Coal Co., the Hutchinson Coal Co., the Federal Coal and Coke Co., the Elkins Coal and Coke Co., the Clark, the Hite, the Jones and the Tom Arnette interests. The operators along the Coal & Coke Ry. and the Grafton & Belington division of the Baltimore & Ohio R. R. were also represented.

While many of the operators were not markedly enthusiastic regarding the plan which the Consolidation Coal Co. is to put into effect, yet nevertheless all the companies agreed to cooperate, the plan being finally approved by the Central West Virginia Operators' Association which recommended that individual operators adopt it.

Following the action taken by the operators, the employees of the mines in the Fairmont district are holding meetings and electing committees as provided under the plan of agreement.

Enthusiastic Liberty Bond Sellers

From Logan County, West Virginia, the information comes that the 175 employees of the Gay Coal Co. purchased on Saturday, May 11, between four and six o'clock, \$12,000 worth of bonds, about \$68 per employee. One man, Shade Nelson, the stable boss at the mine, who made good money and was in comfortable circumstances refused, it is said, to buy a bond. Every other man and many women and children had their names on the honor roll. When on Monday Nelson was found to have persisted in his refusal to buy a bond, a committee of mine employees waited on H. S. Gay, Jr., the general manager, and insisted that a bond-buying boss handle the stable or they would not go to work.

And now a report from Illinois. Miners employed at the Kortkamp mine, near Hillsboro, refused one day last week to be lowered into the mine or hoisted out of it by an engineer who was not loyal enough to buy a Liberty Bond. They took the position that a man who would not purchase a bond when working steadily at a good salary, was not only dangerous to the community but a source of danger to the men who placed their lives in his hands every time they entered or left the mine. They were frank to say that such a man might be disloyal enough to wreck the workings. The situation became so tense that the engineer called for his pay and left, and a bond-buying engineer was put in his place.

On May 11, Chairman Harry W. Coffin, of the Liberty Loan Committee, announced to the Alabama Coal Miners Association that the coal miners of Alabama had purchased more than \$500,000 worth of Liberty Bonds of the third issue, showing that Alabama is not lacking in good citizenship.

One Day's Work for the Red Cross

The mine workers and operators of the Island Block Coal Co., of Island, Ky., a concern in the western part of that state, have already contributed a day's output to the American Red Cross. The miners put in a full day without pay, and the company donated 500 tons to the Red Cross funds. Not a single man failed to be in his place and the production for the day testified to the intense patriotism of the men.

Ostel Bullock, of Cleaton, Ky., furnishes the following story regarding some mines in Muhlenburg County, western Kentucky, which shows that the hearts of the miners are as tender as their hands are hard:

"Some time after the United States entered the war a difference arose between the mine workers and the operators as to the wage to be paid. In many cases strikes were the outcome and the production of coal was in consequence greatly restricted. The public censured the miners roundly, and some even said that the industry was a 'slacker.' This cut the miners to the bone, for they were

more than willing to give their whole-hearted assistance to their country.

"They determined to show their patriotism and resolved at one of their union meetings to work one day without pay if the company would give to the Red Cross the equivalent of the selling price of the coal that the mine loaded on that occasion. There are four mines near Cleaton, Ky., and the output of the 'Red Cross day' was about 3325 tons. Sold at the Government price, this coal will net about \$8000.

"One man who had not worked in the mines for several years decided to come back for one day to participate in this good cause. He loaded out 22 tons of coal, the record tonnage for the day. At least one mine, the Lam operation at Bevier, broke all its previous records. Every dog on the endless rope was working and only one dog during the entire day passed up the incline without its load of coal.

"The mine lost 35 min. by a derailment, and toward evening the loose coal in the mine was all loaded out so



MURPHY AT THE BAT FOR UNCLE SAM

that the plant had to be shut down 40 min. before the proper quitting time. Any one who failed to work on 'Red Cross day' by reason of sickness was to give his next day's work, and all were warned that if any man quit just before the day he would be required to contribute the largest day's pay still accruing to him.

"Every man, however, came out to work and stayed in the mine till he had loaded a full turn of coal. The Rogers Coal Co.'s mine, which is the 'Lam mine' aforesaid, donated 1280 tons; the Crescent Coal Co., 650 tons; the Bevier Coal Co., 225 tons, and the Holt Coal Co., 480 tons. All this shows that District No. 23, comprising western Kentucky, has some patriotic mine workers in its membership.

Perhaps here is a good place to rectify a statement regarding the western Kentucky miners of District No. 23, appearing on page 550 of the issue of Mar. 23, 1918. It ran as follows:

"The mine workers also recommended that the Government intervene to secure that powder be sold them by the operator at a lower cost. At the present prices no one but operators will sell miners powder, but that is not enough, they want the operator to accept an even larger loss in handling powder than that which they now sustain."

H. H. Vincent, secretary-treasurer of the district, declares this a misrepresentation, the prices ranging from \$2.25 to \$3 per keg and the average price being \$2.50. He says that the wholesale price of powder does not exceed \$2.15. On inquiry we learn from one union operator that the actual cost of powder as received by him is \$2.12½ per keg. He assumes the cost of unloading it, the fire risk, the cost of hauling it into the mines and the cost of distributing it to the working places and charges the miners \$2.50 per keg. He does not figure that any profit is made on the transaction. There is no agreement as to the price, but the operator informs us that the price seems to be general throughout the district and adds that the men are satisfied with both the price and with the way the powder is distributed.

A nonunion operation puts the price to the company at \$2.15 to \$2.25 and the selling price at \$2.50. "The selling price of \$1.75 per keg remained in effect for more than six months after the wholesale price of powder had increased to more than that figure. It was changed to \$2 per keg July 15, 1917, at which time powder was again advanced to \$2.50 without protest on the part of the miners."

Margins used to be about 75c. per keg, powder selling at \$1.75 per keg that could be purchased delivered at 95c. to \$1. The margin then was three times as large as it is today. In many mines competition had made it difficult or impossible to operate without loss, and the profit on powder, 75c. to 80c. a keg, helped the company to secure a safer balance sheet.

The mine workers it would seem should be willing to pay the 25c. to 37½c. per keg that is asked for the handling of this merchandise. It is only a small charge. On few sales of merchandise is so little as 10 per cent. charged for selling and distributing. Even the larger figure that we have noted—17½ per cent.—is not unreasonably large. Where \$3 a keg is charged the companies demanding it might well be restrained by the Fuel Administration from such a course.

But this does not extenuate the misstatement made, and District No. 20 and its polite secretary-treasurer, H. H. Vincent, are entitled to a retraction. Surely one should not withhold apology from men who are so generous to the Red Cross.

Union Threatens Coal-Price Cutters

The United Mine Workers of America in Illinois and elsewhere have long suffered because they have had to work for "hardly-able" coal companies. It must be conceded that they got their pay invariably and on time, but the mines were not run as they would have been had the operators been successful business men instead of "pikers."

Everywhere things were skimmed and allowed to run down. Further, the operators, in many cases opposed or were indifferent to the passage of laws regarding safety, because they knew that if the laws were passed the coal in neighboring states with less restrictive legislation would drive their coal out of the market.

Moreover, on every occasion in which the mine was idle the day men were laid idle also. The miners are fully convinced that they do not want to work any more for poor corporations, and the attempt of the railroads to buy coal at cost or less than cost finds the mine worker almost as much up in arms as his employer.

Frank Farrington, president of the Illinois United Mine Workers, has sent a warning to the presidents of the three operators' associations in the state that any cut in coal prices by the operators will be looked upon with suspicion by the miners, adding that price cutters may expect trouble from the organization. He points out that the prices made by the Fuel Administration have been carefully considered and adjusted and that a cut in prices would mean either that the operator must suffer a corresponding loss in profits or meet the reduction in price by lowering wages or by making the working conditions of the miners less favorable.

He says that the prices fixed by the administration are necessary if the operators are to be enabled to meet the legitimate cost of production and at the same time reap

a reasonable profit. "In order," he says, "that the mine owners may keep their mines in the safe condition required by the state mining law, pay the wage scale provided in our joint agreement, furnish the miners with the working conditions they now enjoy, pay the indemnities provided by our compulsory compensation law in the event of injury or death occurring during the course of employment, and meet other legitimate items that enter into the cost of production, and, finally, reap a reasonable return on their investment, they must receive the prices designated by the Fuel Administration."

"At the present time thousands of miners in this state are working only one or two days per week, because many large consumers of coal, particularly some of the railroads, are withholding their purchases with the obvious intent of creating a competitive condition that will enable them to get their coal at a price lower than that designated by the Fuel Administration. This tends to create a panicky feeling among the mine owners causing a reduction of selling prices."

Frank Farrington adds that if consumers will begin now to lay in next winter's coal supply, instead of holding off with the hope of getting it at a lower price than that designated by the Fuel Administration, their action will furnish work to thousands of men in the state during the summer months who are now lying idle and who are extremely anxious to do their bit. It will also enable many men who have been liberal purchasers of war bonds and stamps and contributors to war funds to continue to perform their duty in this respect. They cannot do so if they are compelled to lie idle the greater part of the summer. He concludes as follows:

"As president of the 90,000 men employed in and around the coal mines of Illinois, I hereby warn you that any operator in this state who is guilty of any act that places the wages and the interest of the men who mine the coal in jeopardy will be regarded as being an enemy, and we shall be constrained to take such action as may be within our power to protect-ourselves against his act of enmity."

Who Is "Within the Peace of the People"?

Slow progress is being made in the selection of a jury to try seven coal miners and four other men on the charge of murdering Robert P. Prager, the mine worker who was lynched at Collinsville, Ill., Apr. 5.

Better progress is now being made with the trial, for Sheriff Jenkins and his deputies and bailiffs have been disqualified. State Attorney Streuber made an affidavit that the sheriff, who was formerly a coal miner, and his men were prejudiced in favor of the defendants and had summoned as talesmen only those believed to be favorable to the interests of the defendants. Special deputies appointed by the court are bringing in better jury material.

The questioning of veniremen has disclosed that the defense is to be based on the unwritten law of patriotism. Attorneys for the defendants say they will prove that Prager was a German spy and will contend that Prager was not killed "within the peace of the people," as the statute reads, and being engaged in a disloyal enterprise took the same chances of being killed that the burglar takes. The attorneys contend that the defendants had the same right to kill Prager that a householder has to kill a burglar. State's Attorney Streuber says the state will show by Supreme Court decisions that the protection of the law extends, without any question whatever, to alien enemies, criminals and all others.

The defendants wear the national colors on the lapels of their coats. Many miners are attending the trial, including local and district officers. They have promised to show that Prager was a spy, but so far have not revealed the evidence on which they base their declaration.

The Dauphin County court awarded damages to the amount of \$350 to three miners of the Susquehanna Coal Co., of Philadelphia, Penn., who sued the corporation for sums deducted from the pay for hard coal mined which the company declared to be below standard.

DISCUSSION BY READERS

After the War, What?

Letter No. 1—To a much interested though unbiased traveler in the anthracite and bituminous coal fields, a large number of the medium-sized and mostly all of the smaller operations appear to be adopting a restricted policy, which cannot but prove unwise, in respect to the future development of the coal industry, in that no provision is being made for the increased demand for coal that will unquestionably occur when the war has ceased. This prediction is particularly true, I believe, in respect to the bituminous mines.

Let me be perfectly frank and say that a great many of the mine operators, including some of the larger ones, have adopted the policy of saying that they do not know what the future holds for them, and, therefore, they will let well enough alone and make no plans whatever for the development of the properties they are now operating and much less for those in prospect.

PESSIMISM AMONG SOME COAL OPERATORS

Many coal operators take the viewpoint that the present government-regulated price of coal is only temporary. They predict that when the war is over the bottom will drop entirely out of business and the country will suffer a period of inactivity for a considerable length of time. They believe that this will greatly reduce the demand for coal and that the tonnage produced will exceed the consumption.

This line of argument, I am happy to say, is quite opposed to the thoughts of some of the leaders of American business enterprise, particularly the leading manufacturers of steel and its allied products. For instance, John Wanamaker (though I am quoting a leader in the merchandising business), addressing a meeting of the representatives of a certain trade organization, stated, "When the war is won there will unquestionably be a slight lull in business, until a certain readjustment is made," adding, however, "Such a readjustment will be necessary; but the cessation of big business will be very, very slight. Indeed, for at least four years following the cessation of hostilities the volume of business in this country will be greater than ever before, and the United States will enjoy an era of unprecedented prosperity."

OPTIMISM OF LARGE MANUFACTURERS

Referring now to the largest steel manufacturers in the country, permit me to review briefly what they are doing. The steel corporation interests in West Virginia and Kentucky are making wonderful enlargements in the scope of their operations. The Youngstown Sheet and Tube Co. and the Inland Steel Co. are each opening up a large operation in western Pennsylvania. I might mention, besides, a number of other large new operations such as the Mather Coal Co., the Pursglove-Mather Coal Co., the Bertha Coal Co., etc.

One cannot fail to observe that the far-seeing business people and leaders of industry are preparing, at the present time, for the years of activity that are bound to follow the allied victory. To such will come the reward by reason of their ability to then produce what the world will demand, and that, in their judgment, will exceed the need of the present time.

If these larger corporations can, with entire safety, appropriate large sums of money for the development of new and old operations alike, it certainly follows that the managers of smaller propositions can proceed with entire safety to lay their plans for a large volume of business in the future.

In my opinion, the coal-mining industry should look forward to a large volume of business, for years to come, and should feel a positive assurance that the prices for coal will remain as high as they are at present, with a possibility of going even higher at a later date.

The subject is one worthy of the most careful consideration by coal operators of every class, and I express the hope that there will be a further discussion along this line, which I firmly believe will prove the truth of my conviction. If such is the case, operators must increase the efficiency of their haulage systems, by providing up-to-date motive power and other mine equipment that will be needed in the new development work required to meet an unprecedented demand for coal.

P. H. KENNEDY.

New York City.

Employment of Mine Labor

Letter No. 1—At a recent meeting of the American Institute of Mining Engineers, as reported in *Coal Age*, Mar. 23, p. 554, the members discussed the question of the utility of an "employment manager," charged with the duty of hiring all the men employed by a large industrial organization. The discussion presented some interesting phases applicable to the management of a large mine, and it would be interesting to know what the readers of *Coal Age* think of the suggestion.

Such an employment manager must be a person of ripe experience and judgment, who would be able to size up a man, so to speak, and determine his capability to perform work of a given character. He should know the organization and its requirements from A to Z, in order to determine an applicant's fitness for any position from janitor or office boy up the scale.

The scheme possesses the advantage that an employment manager would have the time and facilities to investigate the merit and worth of each applicant. Foremen know what kind of men they need, but their duties in the mine will not permit them to devote any time to look up a man's previous record. As a consequence, when a foreman hires a man he is obliged to test his capability by the manner in which he performs his work in the mine. At times this may result in serious loss.

A special feature to be considered in connection with the hiring of men, by the employment manager of a large coal-mining company, is the fact that such a company will generally have more than one mine in operation. A man found not adapted to the work or not satisfactory to the boss in one mine can then be sent to another mine, where he may have less difficulty in making himself useful.

While centralized hiring of men may be impracticable in certain large manufacturing plants, it occurs to me that the scheme can be successfully applied to large coal-mining corporations. In my opinion the superintendent of a large coal company, by reason of his long experience and responsibility, would be well fitted to select and hire the men required in the various branches of the work. It should not impair the foreman's authority in the mine when his men are hired by the superintendent, and it would relieve the foreman of that responsibility and permit him to devote his whole time and energy to the supervision of the work underground.

FOREMAN'S RIGHT TO DISCHARGE HIS MEN

There will, no doubt, be those who will differ with me in regard to a foreman's right to discharge a man whose work is not satisfactory to him; but I believe such a man should be sent back to the superintendent for whatever disposition that official chooses to make of him. Unless the man is wholly irredeemable, he can generally be used to advantage in another position.

A motorman who may be incapable of performing his work properly under the conditions in one mine may prove a valuable worker in another mine where the conditions are more favorable. Likewise, a miner who fails to load clean coal in one mine or under one boss may be found wholly tractable when working in another mine where the boss is more affable.

When a man's work is unsatisfactory to the foreman, there are frequently two sides to the difference existing between them. The man may say that he cannot get along with the boss, while the boss will claim that the man will not do the work as he wants it done. If it is a question of the man persisting in having his own way and refusing to obey the instructions of the boss, it would indeed be a poor policy to allow such a man to go to work under another boss employed by the same company. Such a proceeding would destroy the authority of the first boss, whose men would soon learn to override him and do as they pleased.

Under the conditions just named, it would be natural for a boss to conclude that it was of little use for him to strive to make his mine a paying proposition if men who persist in having their own way can appeal to the superintendent and be sent to another mine or put to work on another job. However, I believe that such matters can often be handled with diplomacy and the difference adjusted by the superintendent, without the necessity of the company losing the man. It may be even within the range of possibility that the man could be reconciled to perform the work in the manner in which he was asked.

In closing, let me say that, notwithstanding these difficulties, I still believe that the hiring and discharging of men by the superintendent would place the labor problem on a more successful and scientific basis than

it is under the present system. A foreman of sufficient experience and hardened to his work is usually fair-minded enough to want to see everybody get along. He is glad to see somebody else dispose of his unsatisfactory labor and is just as well pleased that someone else will hire the man.

W. H. NOONE.

Thomas, W. Va.

Echoes from the Mine and Camp

Letter No. 2—The letter on this subject, *Coal Age*, Apr. 20, p. 756, signed "M.P.H.," interested me greatly. The writer explained many points that only a man working around the mine and living in mining camps knows. Speaking of the many respects in which the miner is capable of improvement, let me say that a volume could be written on that subject, but there are two points that are of special importance, and these relate to his improvement morally and socially.

In considering the means that can be adopted or the methods that can be successfully employed in the moral and social advancement of the miner, I would class these under the following heads: Education, Economy, Industry and Independence or Self-Reliance.

We will assume that the miner is a person capable of being educated. It is freely admitted that, as a general rule, the coal miner is not well informed on matters pertaining to his own uplift. Owing to the want of an early school education, the average miner today possesses little knowledge of the most simple elements and requirements for his own success in life. Nevertheless, I claim that he has far more intelligence than many are willing to give him credit as possessing, although there is much room for his improvement, both morally and socially.

EDUCATION THE GREATEST FACTOR

The greatest factor in one's moral and social advancement is education. By close study a man learns many facts that give him a broader outlook on life and a deeper insight into his surroundings. But this is not all of education. By close observation of others, a man learns much that will assist him to elevate his own standard of living.

The miner, like every other individual, must have a desire to educate himself by adopting these means. The desire for education is the sure foundation for its success. Where there is no desire on the part of the individual, efforts for his betterment can only end in failure. The first endeavor, therefore, must be to create the desire for education.

It is true, as stated in the letter to which I have referred, that there is too great a tendency to classify men according to their occupations. The result has been that the miner who toils underground is too generally regarded as little better than a serf, by many people who do not know that, among all the toiling millions in the United States, the coal miner is the most generous and liberal-hearted of men. The rank and file of miners are, today, proving their loyalty by the purchase of Liberty Bonds and subscription to the Red Cross and Y.M.C.A. movements.

The news of strikes and disturbances in coal mining camps and districts comes, to those unacquainted with

the conditions under which this class of toilers exist, as echoes of what they wrongly assume is the true character of the miner. In many instances it must be admitted that his false ideas of economy are responsible for these results.

Let me illustrate my meaning here, by saying that a miner obtains employment to mine coal at a fixed rate, per ton or per car, on condition that he will securely support the roof in his working place and throw out the bony coal and other impurities and load only good coal in his car. Like the rest of us, however, the miner is anxious to make big pay; and, to economize his time, he hurriedly sets but a few props in his place, and fails to give close attention to separating the impurities from the coal when loading his car. Contrary to his agreement to abide by the rules of the mine, many a time the miner will rob his pillar to obtain cheap coal.

Such acts and misdemeanors lead to trouble, and a strike is proclaimed. The real cause of the disturbance and seat of the trouble is the lack of education on the part of the miner and his false ideas of economy, which it is our duty to overcome and eradicate as far as this is possible. The miner must be taught that his interests and the interests of his employer are common.

Speaking of industry, the average coal miner is a hard worker. Practically the only exception to this rule is to be found in that class who are enslaved by the drink habit, and spend their time in the saloons, for days and weeks following pay at the mine. This is another echo from the mining camp, which gives a wrong impression of a true miner's character.

To save the miner, in this respect, the saloon must go. No success in moral or social advancement can be attained as long as it remains. Every effort must be put forth to accomplish this end, if we would better the miner's condition and educate him to be the industrious, independent and self-reliant worker that is needed.

Kingston, Penn.

FRED B. HICKS.

Mass Education Needed

Letter No. 4—I recall reading a letter published some time ago on the need of educating the great mass of the miners employed in the mines. The letter set me to thinking on my own experiences in life during the past four decades.

When a very young man, full of energy, I commenced at the grass roots, in assisting to sink some very difficult and very deep shafts. When the shafts were down I continued to assist in opening and developing the mine. The work gave me some idea of coal mining, as there were clay veins and other difficulties encountered. In one instance, a dyke cut out the coal completely, necessitating the driving of a stone drift to again reach the seam. Various kinds of pumps were used to drain the mine, including one of the old Cornish type. Over a decade was spent in those mines, but in all that time I learned little and had no technical knowledge regarding my work. Let me say that what technical knowledge I now possess was gained from a school of mines where I studied later the principles of mining.

After coming to this country, I studied and obtained a first-class mine foreman's certificate, under the Act of 1893. This success gave me a renewed ambition,

and I said to myself, "Here goes for lots of theory." But, pressure of circumstances robbed me of my opportunity to improve myself in a theoretical way. At times I was reasonably well located, and, at other times, I was forced into a very uncongenial situation.

Thus passed twenty years or more of hard study and labor. At one place I attempted to redeem a large abandoned machine mine. It took three or four years for me to discover that it was a useless undertaking. At another time, fortune favored, and I took hold of a new plant. Though I worked as hard as King Solomon's men in building the temple, I failed for the lack of a sufficient knowledge of theory.

My advice, in closing, is that young men should study to acquaint themselves with the principles of coal mining, while they are gaining experience in the practical work of the mine. Perseverance and hard study are sure to bring success in the end.

Perryopolis, Penn.

R. W. LIGHTBURN.

Men in Blind Alleys

Letter No. 4—The writers of the several letters following the Foreword on this subject, which appeared in *Coal Age*, Nov. 10, 1917, have without exception brought to light the most abominable practice existing in the industrial world today.

A superior in office or an employer who intentionally keeps his men in the same rut, without permitting them to advance original ideas or make suggestions of possible improvements in methods and equipment, is so narrow that he has no right to be clothed with authority to superintend a department or direct work.

The man who lives in fear that the men under him may possess an ability that will enable them to rise to his position; and who on that account, limits their activities, ignores their suggestions, or treats with contempt their efforts to improve his plans and methods, is an enemy to progress. No broad-minded superintendent or employer can afford to suppress the display of ability in men under his charge. They should be urged, on the contrary, to acquaint themselves with every phase of the work, both theoretical and practical.

I cannot agree with "Lumen" when he says "A young man is seldom willing to listen to the advice of an honest well-wisher, who has traveled the road before him and whose words should be an inspiration." My belief is that young men are quite generally willing to listen to the advice of older men whose experience is valuable.

YOUNG MEN ARE ANXIOUS TO LEARN

The young man, as I have observed him, thirsts after knowledge and asks to have explained what he does not understand. The young learn fast and one finds it difficult to fully satisfy their desire for knowledge. It is possible that the reference I have quoted alludes to a few specimens that one occasionally meets, who know it all and need to be told nothing. It is true that these, like the poor, we have always with us.

Organizations controlled by men who limit the activities of their workmen, by keeping them in ignorance of knowledge that will enable them to coöperate more successfully, quickly gravitates into an organization of slow, patient, plodding workers who show little vitality or "pep," as we say.

Compare such an organization, for a moment, with one that fosters the desire for knowledge on the part of every employee. Here, we find men being trained for doing better work and reaching a higher position. Every worker is fired with an ambition to know all about his own work and something of the other fellow's. The superintendent or employer invites suggestions from his men and, in some cases, offers bonuses for ideas that are accepted. It is not strange that an organization of this kind increases its business and its assets, year by year.

If progress in business is desired, every worker must learn the theory and practice of his work. Each man must be encouraged to advance, step by step, toward the next higher position, which will give him the ambition to perform well his present duties. The natural products of such a system are the development of executives who have a thorough working knowledge of the entire system, which alone insures the success of the undertaking.

Fair-minded men must see the merits of educating their workmen. The superintendent who is big enough, fair enough, and has the ability to perform will be promoted to a still higher position when the man under him rises to his place. Progress demands leaders who are clear-headed, thorough-going men. The march of progress automatically weeds out the weaker and more fearful men, whose places are quickly filled by stronger and broader-minded workers.

FRED L. SERVISS.

Golden, Colo.

Explosion in Compressor Cylinders

Letter No. 1—Regarding the reference to the possibility of an explosion occurring in the compressor cylinder, made in a correspondent's letter, *Coal Age*, May 11, p. 893, I want to endorse the editorial comments following that letter as being well worth while.

Experience in the compression of air has taught me that carbonization takes place quite rapidly on the compressor valves and cylinder walls of the small portable compressors used in mine service. This can only be prevented by giving proper attention to the selection of a high-flash test oil and by a thorough cleaning of the compressor at frequent regular intervals.

Allow me to suggest that master mechanics and mine foremen will do well to make frequent inspection of the valves and cylinders of these portable compressors and see that they are kept clean and free from deposit. As a rule, these small, portable, motor-driven compressors are almost automatic in operation, and mine officials fall into the habit of giving them little or no attention, generally permitting them to run themselves, until their action gets so bad that complaint is made, in regard to the efficiency of the drills or coal-cutters. The result is that, in nine cases out of ten, the manufacturer is blamed.

Let me add, in closing, that if poppet, inlet and discharge valves on compressors, in the engine room, should be inspected and cleaned at frequent intervals, it is even more important that this should be done on the smaller portable compressors operated underground.

S. B. KING,

Chicago, Ill.

Sullivan Machinery Co.

Working 10-Ft. Inclined Seam

Letter No. 3—Kindly permit me to offer a few suggestions that may assist "Superintendent" to solve his difficulties, which he has described in the inquiry, *Coal Age*, Mar. 23, p. 561.

The inquiry states that the coal is pitching from 15 to 20 deg., the seam being 10 ft. in thickness and troubled with faults and pinchouts. I understand from the description that the roof is of a shelly nature, making it weak and difficult to support, while the floor is a sandy shale.

It is unfortunate that the area of the coal property is not given, as that is an important factor in deciding on the plan of working and method of ventilating a mine. This is especially true when there are surface streams that must be considered in the development of the mine. Such features are liable to cause much trouble and expense in pumping if sufficient precautions are not taken to avoid this difficulty.

GENERAL PLAN OF WORKING SUGGESTED

My first suggestion is to open the mine on the split-air system, so that it will be possible to ventilate each district of the mine separately and thereby control the circulation according to the need in each section. I would drive the main slope on the full dip of the seam, in the same manner as described by Andrew Bain, in his letter, Apr. 27, p. 803, driving three slopes abreast and making the center one of the three the main intake and haulage road for the mine. This would, in my opinion, be the most practical scheme for ventilating the mine safely and economically.

My second suggestion is to leave 3 ft. of coal up for a good roof, while driving entries and rooms in the first working. The coal being 10 ft. high, if 3 ft. is left for roof coal, the height of the openings will be 7 ft., which will give a good headroom for mules and cars after timbering the places. The cross-entries should be driven on a 1 per cent. grade in favor of the loaded cars. This will not only facilitate hauling but will afford good drainage for the mine.

In working the rooms, I would arrange to have two tracks in each room, so as to install a self-acting incline or gravity plane for lowering the coal from the working face to the entry. To do this I would make use of a rope and sheave by which the loaded car in descending would draw up the empty. The rooms can be driven from 18 to 20 ft. in width, but should have 30-ft. pillars between them. This will give plenty of room for double tracks, with a space for gob between them.

MINER.

Springfield, Ill.

First Aid to the Uninjured

Letter No. 5—At this time, when every available unit of our resources must be hurled against the common enemy, the conservation of life and health is extremely vital, and the question of giving first aid to the uninjured grows in importance. Every mining man can well afford to heed the suggestion and give such aid to men who are yet uninjured, but whose careless-

ness and neglect go far to increase the accident rate in our mines.

In rendering such aid to the uninjured, we are performing a real service to Uncle Sam and helping to do our bit in the great struggle. At the same time, we are performing a lasting service to the man who is yet uninjured and to his family. The country calls for this service in the preservation of life and health, particularly at the present time. Though the men we strive to help may not appreciate our solicitude in their behalf, the task before us is not altogether a thankless one.

In the past few years volumes have been written on the subject of "safety first," and numerous campaigns have been conducted with the same aim and purpose. There are but few instances in which the efforts thus put forth have failed to bear fruit; but, still, the carelessness and neglect of the average miner continue to exact an appalling toll on life and health, although these are of the first importance to the industry and to mankind in general.

All will agree that it is our duty to concern ourselves more seriously with this important matter. Attention has often been called to the fact that statistics show that a larger number of lives are lost annually by reason of falls of coal and roof, at the working face, than from any other cause in coal mining; or, indeed, from all other causes combined.

If one takes the trouble to observe carefully, however, he will find that this class of accidents is less common at certain mines than at others working under the same conditions. He will find that the reason for this is evidently the lively interest taken in first-aid and welfare work by the mine officials at such mines. They are all making earnest efforts to reduce the accident rate to a minimum and the result is gratifying.

One observes with pleasure and satisfaction that, almost without exception, in mines where it is the custom of one or more of the mine officials, superintendents, mine foremen and his assistants, to visit every working place one or more times each day and instruct and discipline the men, the latter as a class become more conscientious in their efforts to avoid danger.

Where such efforts are put forth by the mine official, the miners are not slow to appreciate the fact that this interest is taken in their behalf, and they show a greater interest in their own safety. In such mines we find an enduring safety-first movement. The truth of these statements can be verified by anyone who will take the trouble to investigate those neighboring mines where such a policy is pursued and the working places are invariably inspected, each day, by conscientious mine officials. In my opinion this is the surest and most practical way in which we can render first aid to the uninjured.

SUPERINTENDENT.

Thomas, W. Va.

What Caused the Explosion?

Letter No. 2—An inquiry in *Coal Age*, Apr. 6, p. 645, asked for suggestions as to the possible or probable cause of an explosion, which is said to have occurred in a mine that had been standing idle for a period of two months. It is stated, further, that no one was in the mine at the time the explosion occurred, but it was

found, later, that the blast started in a wet portion of the mine, which had been supposed to be free from gas and where natural ventilation only was employed.

Kindly permit me to suggest that sufficient gas may have been generated in this mine to have caused a considerable accumulation of firedamp, during the long period of idleness, when it is natural to suppose no attempt would be made to ventilate the workings by extending brattices to cause the air current to sweep the working faces and the many void places where gas might lodge. It is possible that this accumulated gas may have been carried to the foot of the 32-ft. shaft where it was possibly ignited by a lighted cigar stub or match thrown carelessly into the shaft.

EXPLOSION CAUSED BY LIGHTNING

In one instance, I remember an explosion occurred in a mine when nobody was underground, and the cause of the explosion appeared a mystery until it was found that the iron pipe, standing a considerable height above the surface of the ground and which served to drain the gas from the mine through a 6-in. borehole, had been struck by lightning. It was assumed, in that case, that the lightning ignited the gas and caused the explosion underground.

Again, it may be supposed that firedamp had accumulated in the waste and that the falling roof striking some sulphur balls in the gob may have caused the sparks that ignited the gas and caused the explosion.

IGNITED GAS FEEDER CAUSES AN EXPLOSION

A remarkable instance of a mysterious explosion was reported a few years ago as occurring in a mine in western Pennsylvania. It was said that no one was in the mine at the time of the explosion, which occurred on Sunday. Neither had anyone been in the mine the Saturday night previous. Such was the force of this explosion that overcasts were blown out and several mine cars were broken into fragments, the remains of which I saw later. Most remarkable of all, however, was the fact that the blast tore loose, from its place where it was spiked, a 40-lb. engine-road frog, which was never found afterward.

This disaster was not discovered until early the following Monday morning, when the fireboss entered the mine to make his examination. In explanation of the probable cause of the explosion, it was decided that a small feeder of gas had been ignited by a shot of black powder and had escaped attention and been left burning when the miners left the mine Saturday night.

It was the custom, at this mine, when quitting to shut off the steam from the fan engine, upon which the speed of the fan was reduced from 75 to 18 r.p.m., the fan being run at this speed by reason of a condensing arrangement, which was operated by a small head of water supplied by a nearby creek. The reduced speed of the fan was insufficient, however, to keep the mine clear of gas, which it is thought accumulated and was carried by the air to where it became ignited by the burning feeder.

LUMEN.

Perryopolis, Penn.

Contributors are cautioned not to omit giving their names and addresses, which will not be published if so requested, and to write on one side of paper only.

INQUIRIES OF GENERAL INTEREST

Detection of Mine Gas

In the course of our work here much interest has been aroused in regard to the detection of mine gas, in daily practice. The question as stated is as follows:

Suppose a man with a standard safety lamp goes 60 ft. into a gangway and his lamp is put out by gas. Is there any positive way by which one can detect with certainty the nature of the gas that extinguished the lamp? It has been claimed, in arguing this question, that a body of methane will extinguish a lamp as quickly and as surely as blackdamp.

INQUIRER.

Upper Lehigh, Penn.

It is true that a body of pure methane unmixed with air will extinguish a lamp as quickly as an accumulation of carbon dioxide or blackdamp. Indeed, the lamp may be extinguished by a mixture of methane and air, when a high percentage of the gas is present and there is not sufficient air to support combustion. Such a mixture is above the higher inflammable limit of the gas. It is even possible for the lamp to be extinguished below this point if the oxygen of the air has been depleted.

In general, pure methane or methane mixed with air, owing to its lesser density, is found at or near the roof in mine workings, while carbon dioxide and blackdamp, being of greater density, accumulate at the floor. In practice, the position of the lamp at the time it was extinguished will often show what gas is present.

However, this is not a universally safe rule, since it is possible for diffusion of these gases to take place in a manner that will alter the density of the mixture and cause the gases to assume a position in the entry contrary to their nature when pure. A similar effect is produced by the relative temperature of the gas and air currents; the warmer medium always seeking the roof, its density being less by reason of its higher temperature. This feature of testing for gas was fully treated in answer to an inquiry, *Coal Age*, May 11, p. 894.

In reply to the question asked, it may be stated that, in order to determine the nature of the gas by which a lamp is extinguished, it is necessary to take into consideration not only the position of the lamp in the entry but the temperature of the currents passing at the roof and the floor, and to observe carefully the action of the flame previous to its extinction.

When a lamp is extinguished by carbon dioxide, or by blackdamp (which is generally a mixture of carbon dioxide and nitrogen, the oxygen of the air being depleted), the flame of the lamp is gradually dimmed for a considerable time before it is finally extinguished. On the other hand, if the extinction of the lamp flame is due to sharp gas, pure methane, or a flashdamp mixture of methane and carbon dioxide with more or less air, the action of the flame previous to its extinction will show a tendency to "capping." The cap produced in a flashdamp mixture must be observed quickly as it dis-

appears almost as soon as formed, and the extinction of the lamp can only be prevented by withdrawing it from the mixture. The extinction of the lamp by a mixture containing methane occurs quickly, while the flame will often show a considerable disturbance or be elongated before it is put out by the gas. It is these appearances previous to the extinction of the flame that reveal to the experienced fireboss the character of the gas present.

Force of a Hammer Blow

A question that was much discussed in our meeting, recently, is how to figure out the force of the blow of a steam hammer, knowing the steam pressure, the area of the piston and the weight of the hammer head. Does the force of the blow change according to the kind of material struck by the hammer? Also, allowing a greater piston travel, would that affect the striking force of the hammer? We would like to see these questions discussed in *Coal Age*.

SECRETARY.

Upper Lehigh, Penn.

It is possible to calculate the energy stored in a hammer at the moment of striking a blow. This stored energy, however, is expressed in foot-pounds. It shows the capacity of the hammer for performing work, and work is the product of two factors, force and distance. In the case of a hammer, the stored energy at the moment the blow is struck is equal to the force of the blow multiplied by the distance through which the hammer moves while being brought to rest by the resistance of the material struck.

For example, if a 2-lb. hammer strikes the head of a nail with a velocity of 10 ft. per sec., the energy stored in the hammer at the moment the blow is struck is

$$\frac{Wv^2}{2g} = \frac{2 \times 10^2}{2 \times 32.16} = 3.109 \text{ ft.-lb.}$$

Now, if it is found that the nail was driven in $\frac{1}{4}$ in., which is 0.0208 ft., the force of the blow is $3.109 \div 0.0208 =$ say 150 lb., nearly.

In the case of a steam hammer the total steam pressure on the piston is found by multiplying the area of the piston by the unit pressure of the steam, and to this product must be added the weight of the hammer head. The combined pressure and weight, expressed in pounds, multiplied by the distance, in feet, through which the hammer falls, will give the foot-pounds of work performed. But, to find the force of the blow delivered, it is necessary to divide the foot-pounds of work stored in the hammer by the distance the hammer moves while its motion is being arrested by the resistance of the material struck. A greater piston travel gives a greater striking force to the hammer; but the actual force of the blow delivered will depend on the density of the material struck, as this will determine the distance in which the hammer is brought to rest.

EXAMINATION QUESTIONS

Illinois Mine Manager's Examination April 2, 1918

(Selected Questions)

Ques.—There are 125,000 cu.ft. of air per min. passing through an airway 7 x 9 ft. in section. The temperature of the air is 62 deg. F., barometer, 30 in.; what would be the horsepower producing ventilation, less the friction?

Ans.—The meaning of this question is not clear, as it is customary to estimate the horsepower producing a circulation of air in a mine or airway, from its frictional resistance, by multiplying the resistance due to friction, expressed by the formula $k v^2$, by the velocity of the air current and dividing by 33,000.

The energy represented by a given weight of air moving at a given velocity, in the ventilation of a mine or airway, has no significance in determining the horsepower producing the circulation. In the given instance, the velocity of the air is $125,000 \div (7 \times 9) = 1964$ ft. per min. The weight per cubic foot of this air, at the given temperature and barometer, is

$$w = \frac{1.3273 \times 30}{460 + 62} = 0.0762 \text{ lb.}$$

The total weight of air passing per minute is therefore $125,000 \times 0.0762 = 9525$ lb. The energy stored in this weight moving at a velocity of 1964 ft. per min. (32.73 ft. per sec.) may then be calculated as follows:

$$H = \frac{W v^2}{2g(33,000)} = \frac{9525 \times 32.73^2}{2 \times 32.16 \times 33,000} = 4.8 \text{ hp.}$$

This may be considered as the horsepower absorbed in setting the air in motion; but it is not the horsepower producing the circulation, which is very much greater.

Ques.—With a 50-hp. fan we are producing 110,000 cu.ft. of air per min., what quantity will be produced with 75 hp.?

Ans.—Assuming that the efficiency of the fan remains constant when its speed is increased to produce more air, the conditions in the mine remaining unchanged, it is customary to estimate the volume of air as varying with the cube root of the horsepower. In other words, the volume ratio is equal to the cube root of the power ratio. Hence, calling the required volume of air x , we have

$$\frac{x}{110,000} = \sqrt[3]{\frac{75}{50}} = \sqrt[3]{\frac{3}{2}} = \sqrt[3]{1.5}$$

$$x = 110,000 \sqrt[3]{1.5} = 110,000 \times 1.145 = 125,950 \text{ cu.ft. per min.}$$

Ques.—Define a "dead hole," as described in the mining laws. Describe the duties of shotfirers in mines where more than two pounds of powder is used in one blast, also, in mines where marsh gas is generated in dangerous quantity.

Ans.—The definition of a "dead hole," as given in Sec. 19 (f), is quite vague as to its meaning. The

law states that a "dead hole" is a hole where the width of the shot at the point, measured at right angles to the line of the hole, is so great that the heel is not of sufficient strength to at least balance the resistance at that point. The meaning of the law is not clear.

A better definition of a "dead hole" is that already given in *Coal Age*, Vol. 9, p. 511, which reads as follows: A "dead hole," in blasting, is one in which the charge is so located that it cannot perform the work intended, or a hole in which the line of least resistance corresponds more or less closely to the axis of the hole.

The duties of shotfirers in both the classes of mines mentioned is to inspect and fire all blasts that have been prepared in a practical workmanlike manner, in the mine. Immediately after completing this work, the shotfirer shall post a notice in a conspicuous place, at the mine, stating the number of shots fired and the number not fired, if any, specifying the number of the room and the entry and giving the reasons why such shots were not fired.

The shotfirer is also required by law to keep a daily record of the number of shots fired, the number of shots failing to explode and the number that, in his judgment, were not properly prepared and which he refused to fire. This record shall be given in charge of the mine manager (mine foreman) and be available for inspection at all times, by interested parties. The law forbids the firing of any shots by the shotfirer before all the workmen have left the mine, and makes it unlawful for a shotfirer to fire any shot that, in his judgment, is not a workmanlike and practical shot.

Ques.—The velocity of air passing through a coal mine is 225 ft. per min. The entry, at the place of measurement, is a concrete arch 10 ft. high, 8 ft. to the springing line and 8 ft. wide. What are the perimeter, area and quantity of air passing per min.?

Ans.—The rectangular portion of this airway is a square 8 ft. on each side. The arch has a rise of $10 - 8 = 2$ ft. The radius of a circular arc whose chord is 8 ft. and center ordinate 2 ft., is found by dividing the sum of the squares of the half-chord and the ordinate, by twice the ordinate, which gives, in this case, $4^2 + 2^2 \div (2 \times 2) = 5$ ft. The angle subtended by half the arc is an angle whose sine is $\frac{4}{5} = 0.8$, or $53^\circ 08'$, or 53.13 deg. The length of this arc is, therefore, $53.13/180 (3.1416 \times 10) = 9.27$ ft. The total perimeter of the airway is, therefore, $8 + 8 + 8 + 9.27 = 33.27$ ft.

Likewise, the area of the sector subtended by the same arc is $53.13/180 (0.7854 \times 10^2) = 23.18$ sq.ft. Then, deducting the area of the triangle, formed by the two radii drawn to the extremities of the chord, which is $\frac{1}{2} (3 \times 8) = 12$ sq.ft., gives $23.18 - 12 = 11.18$ sq.ft. for the area of the segment under the arch. Adding this to the area of the rectangle, $8^2 = 64$ sq.ft. gives $64 + 11.18 = 75.18$ sq.ft. for the sectional area of the airway. The quantity of air passing in this airway is then $75.18 \times 225 =$ say 16,900 cu.ft. per min.

COAL AND COKE NEWS

Harrisburg, Penn.

The departure of several hundred miners from the anthracite region on May 16 was followed by a protest from members of the anthracite operators' committee, who express themselves as alarmed over the possibility of a severe coal shortage resulting from the drain on highly technical labor.

In a statement issued by the operators attention was called to the fact that every miner taken away means the training of another able-bodied man to fill his place, a course of training requiring two years. The two-year apprenticeship is required by the state law before a miner can obtain a certificate or license.

The present number of miners, it was said, is barely sufficient to maintain a maximum of 275,000 tons daily. There are now 153,000 miners, or 24,000 fewer than there were before the war. In describing the effect of constantly drawing mining labor away to other service, the operators said: A miner with his laborer, with effort, can get out eight tons of anthracite daily. A miner being taken away, the laborer cannot work and the resultant loss in output means 208 tons for 26 working days, or 25,000 tons a year for 312 working days. Allowing ten tons of anthracite for winter consumption, means also that 2500 families would be deprived of coal for every registered miner lost to the industry.

An estimated 1,000,000,000 hp. has gone to waste in the past ten years in the 2,000,000,000 cu. ft. of mine gas that is known to have escaped from a single borehole in the vicinity of Luzerne Borough, Luzerne County, according to reports made to W. S. Tompkins, of Wilkes-Barre, by engineers he specially engaged to inquire into the waste of mine gas, which it is proposed by Governor Brumbaugh to put to use in the future as a substitute for coal in various sections of the anthracite field.

This gas has been escaping from the top of the Snake Island vein, which at that place has not sufficient rock cover to permit the mining of coal. This offers substantial proof to what has been asserted before, that there is a large territory in the anthracite fields where the upper vein has not sufficient rock to remove the coal, but does contain methane or mine gas in large quantities.

Great interest is being shown in the investigations that are being made. It has been well established that there are millions of cubic feet of mine gas going to waste daily in the anthracite fields. Experts have declared that this gas can be mixed with air and used successfully for commercial and domestic purposes.

Charleston, W. Va.

In the field covered by the Kanawha Coal Shippers Association, according to figures recently compiled, in the period from May 1 to May 16 there were 19,572 empties received and 18,350 loads delivered. A wreck at Huntington about the middle of the week, however, disrupted coal traffic on the Coal River division of the Chesapeake & Ohio, and the car movement there was at zero, the same cause operating to tie up coal traffic to some extent for two days—Wednesday and Thursday—in the Kanawha region elsewhere.

Just at a time when it seemed the number of cars furnished would enable the coal producer to speed up, the operators met with further discouragement when the Virginian Power Co. caused a shutdown in three fields in this section of the state through failure to furnish power. The shortage was so generally felt that T. L. Lewis, secretary of the New River Association, sent a telegram to Dr. Garfield, United States Fuel Administrator, explaining the situation, in the course of which he said: "Coal mines in New River and Winding Gulf districts of West Virginia idle and supply of navy and bunker coal is endangered. Miners compelled to climb out of shafts of mines, and mules and horses cannot be hoisted out of the shafts. Reported the Virginian Power Co. responsible for closing mines by their failure to furnish power and to keep employed sufficient num-

ber of electricians to equip power plant on account of refusal to pay electricians more than \$75 per month. Conduct of the management of the Virginian Power Co. is an outrage because it closes the mines and denies the miners an opportunity to work and reduces the output of coal required for the United States navy and other Government purposes. Virginian Power Co. has been granted two 10 per cent. increases in their rates for power supplied to the coal mines."

Operators in the New River district report a marked improvement on both the Virginian and the Chesapeake & Ohio railways. The supply within the last 10 days has increased, and the mines as a result have been shipping more coal. The Virginian R.R. has just received five new locomotives, and some attribute the increased supply of cars to such additional power, as the old locomotive equipment was in poor condition.

Operators on the line of the Coal & Coke are receiving a better supply of cars now than has been the case for some time, the Kanawha & Michigan Ry., for instance, having turned over 50 cars to the Coal & Coke at this point last Friday night. Inability, however, of the Kanawha & Michigan to accept loads from the Coal & Coke may delay the distribution of the cars received by the Coal & Coke. The great trouble among the Coal & Coke operators has been that when the car supply was good the labor supply was short and vice versa.

There was a most decided slump in the car supply in the Fairmont region last week, conditions there resembling conditions during the first two weeks of April, when the slump was so discouraging. While at the beginning of the week with a supply of 1427 cars, it looked as if there might be a good week, the shipping facilities afforded steadily declined from day to day, until the latter part of the week, when the number of cars furnished had dwindled to 642. For instance, on Thursday, of 166 mines reporting, 50 were closed, there being 4418 men out of employment and the production loss being 39,900 tons.

Fewer new operations may be looked for in the future, owing to the order of the railroad administration placing restrictions upon the authorization of new sidings, according to both coal men and railroad officials. In cases, however, where companies have taken out charters and invested in plants, entering into contracts with railroad companies for the placing of sidings, it is believed that special dispensation will be granted by the railroad administration and that such concerns will eventually be able to operate. Such special dispensation is the exception rather than the rule, however, and the new ruling is already making itself felt in West Virginia, questions put to operators eliciting invariably the reply that there are no new concerns venturing to open up due largely to the fact that they are unable to secure sidings from the railroad company.

Birmingham, Ala.

Among development announcements gaining circulation during the week is the reported plans of the Railway Fuel Co., which provide for the enlargement of the concern's coal-mining operations at Parrish, Ala. The company's mine at that place will be remodeled and equipped for electrical operation. W. E. Leake, vice president of the company, will be in charge of the work.

The Davis Creek Coal Co. announces the opening of a coal mine near Adger and a new coal company, under the name of the May & Phillips Coal Co. has been organized at Dora, Ala. John D. Phillips is president of this latter concern.

W. H. Ebsary, of Buffalo, N. Y., has been awarded the contract for the brick construction for the furnaces and buildings at Ensley, to be erected by the Tennessee Coal, Iron and Railroad Co. This contract represents an outlay of \$100,000, and it is estimated that 6,000,000 brick will be used in the construction work.

Information gathered from the coal-mining section during the week indicated that the producers expect to be able to announce material improvement in production and quality of coal during the

remainder of the current month. The miners started to work May 17 under the advanced wage scale, and beneficial results are looked forward to. Shortage of workers and inefficient labor, however, is still complained of in many quarters and will operate against material increase in production.

J. B. DeHopper, named by the Government as coal inspector to see that the cleanest coal possible is mined and shipped, has got to work and results are already being noted. However, reports reaching Birmingham indicate that while labor at many of the mining camps in Alabama appears to be as plentiful as it ever was, there seems to be some sort of depreciation in the quantity of the work accomplished and the results attained in actual production.

Winnipeg, Man.

The announcement of T. R. Deacon, fuel controller of Manitoba, that no American anthracite will be shipped to points west of Winnipeg, has created considerable alarm among consumers. Much attention is being devoted to the question as to whether a sufficient supply for next winter can be secured from Western operators. Local representatives of the Coal Sellers, Ltd., the largest wholesale coal distributors of Western Canada, which handles the output of seven Alberta mines with a yearly tonnage aggregating about 1,000,000 tons, state that the company could ship 500 tons daily to Winnipeg and increase this tonnage to 800 or 1000 tons daily in a short time. These coals could be stocked without serious deterioration and are high-grade domestic coals. The company has already stored in Winnipeg some \$100,000 worth of coal for next winter. The Winnipeg dealers, however, are withholding their orders as they still entertain hopes of procuring hard coal. W. J. Dick, a western coal expert, formerly mining engineer for the Canadian Conservation Commission, and now fuel engineer for Coal Sellers, Ltd., states that the talk about Western coal not possessing the necessary heat required for a Winnipeg winter is absurd. He is prepared to prove this by a public demonstration, and to furnish data on government tests showing the high heating value of the Western coals handled by his company. He can also supply data respecting the testing of practically identical American coals in domestic heating furnaces. Jesse Gouge, president of the Newcastle Coal Co., of Drumheller, Alta., states that for the next 100 days Western Canadian mines will be in a position to supply large quantities of coal to Manitoba and Winnipeg. After that time it will be more difficult to ship coal on account of the increased demand and transportation difficulties. Western domestic mines have enough miners to operate steadily, and many of them are putting in coal-cutting machinery and car-loaders to take the place of man-power. He said in regard to deterioration from storage that if Western coal were stored in basements, or under cover, the best grades could be kept for a year without any deterioration. Western coal had eliminated the competition of anthracite in Saskatoon and Regina, where the winters were fully as cold as in Winnipeg.

Atlantic City, N. J.

The first annual convention of the National Retail Coal Merchants' Association ended a two-day convention at the Hotel Traymore, on Tuesday night, May 21, with a banquet at which the speakers included Joseph B. Dickson, of the Anthracite Committee of the Fuel Administration; A. W. Calloway, in charge of bituminous distribution for the Fuel Administration, and F. A. Lewis, Fuel Administrator for Philadelphia.

Mr. Calloway told the diners that the estimated requirements of bituminous for this year totaled 650,000,000 tons and that this might be increased to 680,000,000 tons by July 1.

Mr. Dickson urged rigid conservation owing to the lack of man-power and increased demand. He said that about 79,000,000

tons of anthracite had been distributed during the year 1917-1918, of which about 30 per cent. was steam sizes. Referring to the lack of supplies, Mr. Dickson said that at the beginning of last year there were 3,200,000 tons in storage, while there was none this year.

The convention was attended by coal men representing at least 20 states, and its membership includes 75 per cent. of the dealers of the country. It was organized about six months ago.

Resolutions were adopted strongly protesting against "Coal Week" as advised by the Fuel Administration, and a telegram was sent to Dr. Garfield, the National Fuel Administrator, stating that there was not coal enough to warrant such a demand for fuel as will result from the efforts of the Fuel Administration to have orders placed for coal.

Resolutions were also adopted advocating a uniform price for domestic anthracite coals, allowing a fair profit to every producer and not restricting output.

W. Albert Smoot, Jr., of Alexandria, Va., was re-elected president; John E. Lloyd, of Philadelphia, vice president and Jesse E. Sutter, of Washington, D. C., secretary and treasurer. An executive committee, of which Arthur F. Rice, Commissioner of the Coal Merchants' Association of New York, is a member, was also elected.

PENNSYLVANIA

Anthracite

Parsons—Baltimore No. 5 breaker is almost completely razed. The structure was damaged by fire some time ago and the Delaware and Hudson Co. decided to tear it down.

Shamokin—In keeping with its policy to centralize clerical work and conserve male labor, the Susquehanna Collieries Co. has announced sweeping changes in its office staff and handling of business. Men employed at the headquarters office for a number of years have been assigned to the collieries, where new offices will be erected for the transaction of all business. The main office will serve as a sort of clearing house for the most important matters. At the same time the company announced the appointment of William P. Caldwell as paymaster, succeeding Galen P. Hanley, retired, and of Byron W. Kriher, as chief clerk. William Geise, one of the engineers in charge of the reconstruction of the Government docks at Newark, N. J., has been engaged by the Susquehanna as constructing engineer.

Bituminous

Connellsville—The new coal shaft of the Mather Collieries, at Jefferson, Greene County, has reached the Pittsburgh vein at a depth of 340 ft. and is completed. Fifty miners' houses have been completed in the new town site, all equipped with bathrooms and electric light. Bids are now being received for street grading. The construction of the railroad along Ten Mile Creek between Millsboro and Waynesburg is being pushed as rapidly as possible, as is also the work of constructing the West Penn Power Co.'s pole line to the new mining operations.

WEST VIRGINIA

Algonquin—The Algonquin Coal Co. has let contract for the construction of 25 new frame houses for mine employees. G. B. Farrier, superintendent, states that the company intends doubling its present production. This company has loading facilities on both the Norfolk & Western and Virginian tracks.

Dott—The Turkey Gap Coal and Coke Co. will build 25 new frame dwellings to house its mine employees.

Fairmont—The election of E. B. Moore, as president, Frank B. Pryor as vice president and O. F. Lough as secretary-treasurer of the newly chartered Fairmont Byproduct Corporation, is generally construed to mean that the company is a Monongahela Valley Traction Co. project. J. O. Watson, president of the Monongahela Valley Traction Co., stated a few days ago that negotiations for the byproduct plant had been practically completed and that contracts would be executed in the near future. E. B. Moore, general manager of the traction company, and president of the byproduct company, having gone east for a conference with engineers and plant builders. It is said that the plant will consume over 2000 tons of coal a day including Sundays.

Buckhannon—As soon as a tramway which the company is installing is completed, the Barbour-Upshur Coal Co. will begin the shipment of coal from its mines in Harrison County, probably about the first of June.

Charleston—The Peytonia Mining Co., of which E. B. Snider is general manager, will open another mine in the Coal River field in the near future.

Thirteen miners who were caught behind a wall of fire when the main entry of the Mill Creek Cannel Coal Co.'s mine at Villa burst into flame from some undetermined cause on May 20, were found dead in the workings.

Mannington—Four hundred miners recently escaped death from flames or suffocation by means of a ladder 200 ft. in length leading from the depths of the mine of the Rachel Coal Gas Co., near here. The fire was at the mouth of the main pit and destroyed the compressor and power house, with a loss estimated at \$65,000. The cause of the fire is unknown, but is believed to have been started from a spark from one of the dynamos. The mine will be out of commission for several months.

Wheeling—The large, new tippie of the Triadelphia mine, capable of loading from 60 to 80 cars per day, has been placed in commission. The old tippie will be removed in a few weeks.

Logan—Automatic sprinklers are being installed by the McGregor Coal Co. at its mine at Slagle, Logan County.

A tract of coal in Logan County will soon be developed by the Carr & Hall Coal Co., recently organized at Stollings, W. W. Hall, of Huntington; A. D. Carr and Frank Harman, of Logan, being interested in the new enterprise.

TENNESSEE

Nashville—J. S. Denton, chairman, and W. W. Baird, of the State Board of Control, recently returned from a trip to the mines in Herbert Domain and Brushy Mountain mines at Petros. It was reported that operation of these mines was greatly curtailed in April through an epidemic of la grippe that involved more than one-half of the prisoners working the mines, numbers being confined to the hospital wards, while three deaths resulted from pneumonia. Production was reduced greatly, and also profits. However, profits for the month ran over \$37,000, as against \$50,000 in March. It is believed that profits for the year will run about \$500,000 if they continue as high as during the first four months. Preparations are being actively pushed for installing new power machinery, but this advantage may be largely offset by the constant reduction in the volume of prison labor through paroles, expirations, pardons, etc., and by the falling off of the number of prisoners received due to better conditions and the war.

KANSAS

Pittsburg—Mine workers employed in the Clermont Coal Co.'s mine No. 16 have voted on an assessment of \$5 per man for the support of the American Red Cross. This amount is to be paid \$1.25 per month for four months. Thereafter the men will contribute, by reason of the same vote, the sum of \$1 a month per man during the continuation of the war.

ILLINOIS

Springfield—Operators and board members of the United Mine Workers held a two days' joint board meeting here during the past week. Minor disputes were thrashed out in a manner satisfactory to both sides. Friends of Frank Farrington, president of the Illinois United Mine Workers, headed by C. J. Daly, started a boom during the past week for his nomination for the United States Senate. When Farrington, who is in Washington, was apprised of the movement he wired that he had not been consulted and declaring his purpose, to continue serving as president of the mine workers.

The miners of Sangamon County have agreed to give \$10,000 to the Red Cross. The 290 men employed at the Tuxhorn mine near Springfield have pledged to give \$1 each a month as long as the war lasts. The money will be taken out of the men's pay, 50c. each pay, and turned over to the Sangamon County branch of the Red Cross. The first payment, however, May 30, will be \$1 from each man. The mine was 100 per cent. on the Third Liberty Loan. The men employed at the Klondike mine near Springfield voted \$550. The Jones & Adams men voted to give 50c. a pay for the duration of the war, a total of \$250 to \$275 a month. The men at Citizens' Mine A and Mine B voted \$2 a man. At other mines the men voted to subscribe their pro rata of the \$10,000.

Banners were presented to Local No. 2654 of Springfield, Local No. 600 of Cantrall and Local No. 1903 of Auburn, for having made 100 per cent. in the Third Liberty Loan drive. Nigger Hollow Mine No. 2,

near French Village, has won a 100 per cent. flag by subscribing for \$37,500 Liberty Bonds.

Belleville—An injunction petition has been filed with Circuit Clerk J. F. O'Flaherty by Joseph E. Brehet against the Lattman-Reeb Coal Co. of Belleville. Brehet rented some coal land to Lattman individually, who in turn leased it to the coal company. The petition seeks to prevent the removal of the coal.

Miners in each of the 11 newly organized subdistricts of Illinois voted Tuesday, May 14, for president, vice president and secretary-treasurer. The subdistrict plan of organization was abandoned several years ago, when there were eight subdistricts, but the growth of membership necessitated adopting it again and it was done in accordance with action taken at the State convention at Peoria. The results have not been announced. Contrary to precedent, no general holiday was taken for the voting.

Foreign News

Coal Spur, Alta.—On May 14th an explosion at the Oliphant Munson collieries, caused by the blowing up of the powder magazine from some unknown cause, killed John Brownrigg, manager, and one of the mine blacksmiths, and seriously injured three others.

Nanaimo, B. C.—The Granby Mining, Smelting and Power Co., Ltd., is installing a new mining plant at Cassidy Siding, near here. Roberts & Schaefer Co., of Chicago, has been awarded the contract for the installation of the tippie equipment, which will include a Marcus picking table screen.

Edson, Alta.—The Grand Trunk Ry. will install a coal-mixing plant in order to combine three different grades of Alberta coal into a standard fuel to be used on all the locomotives of the system between Winnipeg and Prince George. This will increase the consumption of domestic coal by 200,000 tons per year. The plant, which will employ about 50 men, will be in operation early in August.

Queens County, N. B.—Active development is being carried on in the coal areas, where every effort is being made to mine coal in sufficient quantities to relieve the shortage. A large amount of Montreal capital has been invested in this field, which is 800 miles nearer the St. Lawrence markets than the New Glasgow mines. In addition to the Minto Coal Co., which is producing over 3000 tons of coal weekly, the following companies are operating in the Minto-Newcastle district: Avon Coal Co., Ridge Coal Co., Reed Construction Coal Co., McDougall Co., Midland Coal Co., Northfield Coal Co., Grand Lake Coal Co., and Smith & Merrithew, Ltd. The scarcity of labor is not seriously felt. Miners are receiving from \$8 to \$12 per day and ordinary laborers \$2.50. Plans are being made for the opening of many new mines and a great increase in the output this season is anticipated.

Personals

R. E. Bowen, formerly assistant engineer for the Harlan Gas Coal Co., Harlan, Ky., has enlisted in the 27th Engineers for Government work in France.

L. A. O. Gabany, formerly with the Alabama Consolidated Coal and Iron Co. and the Southern Steel Co., of Birmingham, Ala., is now coke expert with the Peabody Coal Co., of Chicago, Illinois.

J. L. Perdue, for several years mine foreman for the Turkey Gap Coal and Coke Co., Dott, W. Va., has resigned to accept a similar position with the Solvay Collieries Co., Springfield, West Virginia.

Justus E. Altmiller, general manager and engineer for the Diamond Coal and Land Co., Hazleton, Penn., has been elected president of the Hazleton Chamber of Commerce, succeeding H. A. Schmoll.

Melvin I. Bowen, formerly general superintendent for the Cambria Coal Mining Co. at Briceville, Tenn., has resigned that position and leased the Middleridge mine, operating for himself. He has moved his family to Coal Creek, Tennessee.

J. B. Simonton has been appointed superintendent of mines 88, 89, 90 of the Consolidation Coal Co. at Wyatt, W. Va., vice George DeBolt, Jr., resigned. Mr. Simonton has been in the employ of the company for a number of years and his promotion came as a reward for the faithful performance of his duties.

Dan Franklin has resigned his position as mine foreman for the S. J. Patterson Pocahontas Co., Arista, W. Va., to engage with the Solvay Collieries Co., Marytown, W. Va., in the same capacity. This brings Mr. Franklin back to his former employers, he having worked for this concern for years as mine foreman at Springton, West Virginia.

H. B. Walbridge, lately of New York, has been appointed agent for the following companies: The Pawama Coal and Coke Co., Matoaka, W. Va.; Algonquin Coal Co., Algonquin, W. Va.; and Deparren Anthracite Coal Co., Parrott, Va., with headquarters at Parrott, Va. Mr. Walbridge will serve principally as assistant to J. H. Parrott, general manager of these companies. Mr. Walbridge served for a number of years as secretary of the American Coal Co., New York.

Obituary

William W. Craig, a prominent business man of Montreal, Can., died on May 12. He was well known in connection with the stripping business and was the Montreal representative of the W. H. Bradford Coal Co., Philadelphia, Penn. He was in his 73d year.

William Hamer, mine foreman at Jeanesville, Penn., for nearly 40 years, died at his home in that town on May 14. He began work as a boy of eight on the old Spring Mountain breaker, and continued at the same colliery through its changing fortunes until his death. He was one of the first students of the now famous School of Mines of Scranton, and had been mentioned by his company recently as having a clear record of no accidents for three years.

Coming Meetings

American Concrete Institute will hold its annual meeting June 24-26, at Atlantic City, N. J.

American Institute of Chemical Engineers will hold its summer meeting June 19-22 at Berlin, N. H.

Illinois and Wisconsin Retail Coal Dealers Association will hold its annual convention June 26 and 27, at Hotel Wisconsin, Milwaukee, Wis.

National Coal Jobbers Association will hold its annual convention at Buffalo, N. Y., June 4. Secretary L. Romanski, Old Colony Building, Chicago, Ill.

American Institute of Electrical Engineers annual convention June 26-28 at Atlantic City, N. J. Secretary F. L. Hutchinson, 29 W. 39th St., New York City.

American Society of Mechanical Engineers will hold its spring meeting June 4-7 at Worcester, Mass. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

National Coal Association will hold a meeting May 28 and 29 at the Bellevue-Stratford, Philadelphia, Penn. Secretary, J. D. A. Morrow, 707 Southern Building, Washington, D. C.

Southwestern Interstate Coal Operators Association will hold its annual meeting June 11 in the Keith & Perry Building, Kansas City, Mo. Secretary, C. N. Fish, Leavenworth, Kansas.

Illinois and Wisconsin Retail Coal Dealers Association will hold its annual convention June 26 and 27, at Milwaukee, Wis., with headquarters at Hotel Wisconsin. Secretary, Isaac L. Runyon, Chicago, Ill.

Recent Coal and Coke Patents

Coal Car Cover. A. G. Kahn, Centerville, Md., 1,258,576. Mar. 5, 1918. Filed Aug. 27, 1917. Serial No. 188,412.

Coal Skip. T. Dingley, Parnell, New Zealand, 1,259,374. Mar. 12, 1918. Filed July 12, 1917. Serial No. 180,182.

Coal Car Cover. J. H. Bruce, Whittington, Ill., 1,258,314. Mar. 5, 1918. Filed June 12, 1917. Serial No. 174,315.

Electric Switch for Mines. E. Leach, Rathmel, Penn., 1,257,255. Feb. 19, 1918. Filed Apr. 12, 1917. Serial No. 161,454.

Miners' Lamp—Carrying Means. L. Smith, Caretta, W. Va., 1,257,037. Feb. 19, 1918. Filed May 24, 1917. Serial No. 170,584.

Automatic Grate for Boilers. A. L. F. Lefevre, St. Denis, France, 1,257,257. Feb. 19, 1918. Filed Sept. 11, 1916. Serial No. 119,536.

Pulverized Coal-Burning Furnace. W. M. Oliver, Parsons, Kan., 1,257,103. Feb. 19, 1918. Filed Mar. 2, 1917. Serial No. 152,086.

Combined Coal Shovel and Ash Sieve. J. F. Wynne, Atlanta, Ga., 1,259,333. Mar. 12, 1918. Filed July 16, 1917. Serial No. 180,876.

Coal Mining Machine. J. F. Conrad and J. Walker, Nettleton, Penn., 1,257,582. Feb. 26, 1918. Filed Feb. 9, 1917. Serial No. 147,689.

Feed Mechanism for Stokers. D. F. Crawford, Pittsburgh, Penn., 1,258,397. Mar. 5, 1918. Filed June 10, 1914. Serial No. 844,211.

Coal Pile. A. C. Johnston, assignor to Link Belt Co., Chicago, Ill., 1,256,569. Feb. 19, 1918. Filed Dec. 21, 1916. Serial No. 138,184.

Mining Machine. C. E. Davis, assignor to Goodman Manufacturing Co., Chicago, Ill., 1,256,524. Feb. 19, 1918. Filed May 11, 1915. Serial No. 27,347.

Hopper Car. A. Campbell, assignor to Enterprise Railway Equipment Co., Chicago, Ill., 1,257,270. Feb. 19, 1918. Filed Jan. 22, 1916. Serial No. 73,571.

Ash Conveyor Elbow. L. A. Griffin, assignor to American Steam Conveyor Co., Chicago, Ill., 1,258,893. Mar. 12, 1918. Filed Nov. 9, 1917. Serial No. 201,166.

Mining Machine. F. S. Washburn, assignor to Goodman Manufacturing Co., Chicago, Ill., 1,256,619. Feb. 19, 1918. Filed July 21, 1911. Serial No. 639,712.

Publications Received

Among the Coal Miners. International Committee of Young Men's Christian Associations, Industrial Department, New York. Illustrated, 20 pp., 6 x 9 inches.

The College Man's Opportunity. International Committee of Young Men's Christian Associations, Industrial Department, New York. Illustrated, 24 pp., 5 x 7 inches.

Cannel Coal in the United States. By George H. Ashley. Department of the Interior, United States Geological Survey. Bulletin 659. Illustrated, 127 pp., 6x9 inches.

Americanization Through Christian Leadership. International Committee of Young Men's Christian Associations, Industrial Department, New York. Illustrated, 12 pp., 5½ x 8½ inches.

New Views of the Combustion of the Volatile Matter in Coal. By S. H. Katz. Department of the Interior, Bureau of Mines. Technical paper 183. Illustrated, 13 pp., 6x9 inches.

Initial Priming Substances for High Explosives. By Guy B. Taylor and W. C. Cope. Department of the Interior, Bureau of Mines. Technical paper 162. Unillustrated, 24 pp., 6 x 9 inches.

Monthly Statement of Coal Mine Fatalities in the United States, January, 1918. Compiled by Albert H. Fay, Department of the Interior, Bureau of Mines. Unillustrated, 21 pp., 6 x 9 inches.

Use of Permissible Explosives in the Coal Mines of Illinois. By James R. Fleming and John W. Koster. Department of the Interior, Bureau of Mines. Bulletin 137. Illustrated, 103 pp., 6 x 9 inches.

Effects of Moisture on the Spontaneous Heating of Stored Coal. By S. H. Katz and H. C. Porter. Department of the Interior, Bureau of Mines. Technical paper 172. Illustrated, 23 pp., 6 x 9 inches.

Determination of Unsaturated Hydrocarbons in Gasoline. By E. W. Dean and H. H. Hill. Department of the Interior, Bureau of Mines. Technical paper 181. Petroleum Technology 42. Unillustrated, 22 pp., 6x9 inches.

Oil-Storage Tanks and Reservoirs. With a Brief Discussion of Oil in Storage and Methods of Prevention. By C. P. Bowie. Department of the Interior, Bureau of Mines. Bulletin 155. Petroleum Technology 41. Illustrated, 70 pp., 6 x 9 inches.

Lighting for Production and Safety. By William A. D. Evans. Cooper Hewitt Electric Co., Hoboken, N. J. Illustrated, 20 pp., 7 x 10 inches. Comprising the study and selection of a system of illumination with a view to ultimate efficiency of the plant.

Geology of the Oamaru District, North Otago (Eastern Otago Division). By James Park, F. G. S., Dean of the Mining Faculty, Otago University, Dunedin. New Zealand Department of Mines, Geological Survey Branch. Bulletin No. 20 (new series). Illustrated, 119 pp., 8½ x 11 inches.

Mineral Industries of the United States—Sulphur: An Example of Industrial Independence. By Joseph E. Pogue, Division of Mineral Technology, United States National Museum. Smithsonian Institution. United States National Museum. Bulletin 102, Part 3. Illustrated, 10 pp., 6½ x 9½ inches.

Mineral Industries of the United States—Coal Products: An Object Lesson in Resource Administration. By Chester G. Gilbert, Curator of Mineral Technology, United States National Museum. Smithsonian Institution. United States National Museum. Bulletin 102, Part 1. Illustrated, 16 pp., 6½ x 9½ inches.

Mineral Industries of the United States—Fertilizers: An Interpretation of the Situation in the United States. By Joseph E. Pogue, Division of Mineral Technology, United States National Museum. Smithsonian Institution. United States National Museum. Bulletin 102, Part 2. Illustrated, 22 pp., 6½ x 9½ inches.

Mineral Industries of the United States—Coal: The Resource and Its Full Utilization. By Chester G. Gilbert and Joseph E. Pogue, Division of Mineral Technology, United States National Museum. Smithsonian Institution. United States National Museum. Bulletin 102, Part 4. Unillustrated, 26 pp., 6½ x 9½ inches.

Trade Catalogs

"Puzzledmuch" meets "Sellefast." International Motor Co., New York. Pp. 14; 9x6 in.; illustrated. Talking points on Mack trucks, cleverly illustrated by cartoons.

Coupled and Belt Types of Alternating-Current Generators. Crocker-Wheeler Co., Ampere, N. J. Bulletin 185. Pp. 4; 8½ x 11 in.; illustrated. Covers two- and three-phase, 50 kv.-a. and up.

Direct-Current Lighting and Power Generators. Crocker-Wheeler Co., Ampere, N. J. Bulletin 184. Pp. 4; 8½ x 11 in.; illustrated. Covers direct-connected and engine types (25 to 3750 kw.).

CR 3100 Drum Type Controllers. General Electric Co., Schenectady, N. Y. Bulletin. Pp. 4; 8 x 11 in.; illustrated. Specifications and details for series, shunt or compound wound motors; reversing or non-reversing, starting or speed-regulating duty.

CR 3202 Drum Controllers. General Electric Co., Schenectady, N. Y. Bulletin. Pp. 4; 8 x 10 in.; illustrated. Description of these controllers for slip ring induction motors, 110 to 550 volts, two- or three-phase.

Proper Care of Belts. Joseph Dixon Crucible Co., Jersey City, N. J. Booklet. Contains helpful suggestions for getting maximum results from belts, and in addition has several pages devoted to useful information of a general character.

Satisfaction or—. Armstrong Cork and Insulation Co., Pittsburgh, Penn. Folder. Pp. 4; 3½ x 6¼ in.; illustrated. Deals with the subject of industrial drinking water systems and shows the relation of drinking water to a satisfied force of employees.

Copes Boiler Feed Regulators. Erie Pump and Equipment Co., Erie, Penn. Booklet. Pp. 16; 5½ x 3 in.; illustrated. Data on this method of feed control, which enables peak loads of short duration to be carried with a more uniform working of the furnace.

Link-Belt Silent Chain—the Efficient Drive for Machine Tools. Link-Belt Co., Philadelphia. Book No. 312. Pp. 40; 6x9 in.; illustrated. An excellently prepared booklet, well illustrated, giving reasons and showing why the Link-Belt silent chain drive is the most efficient transmission for operating machine tools.

Economy in Cold Sawing. Earle Gear and Machine Co., Philadelphia, Penn. Bulletin. Pp. 16; 4x9 in.; illustrated. Describes the Lea Simplex cold metal saw. In the fore part is pointed out the points of superiority of design and operation of this machine. Machines are built in four sizes, both belt and motor driven.

Liquid Roofseal. Manhattan Paint Co., Cleveland, Ohio. Circular. Pp. 4; 6 x 9 in.; illustrated. Describes what is said

to be a genuine asbestos roofing in liquid form. It is claimed by the manufacturers that liquid Roofseal renews and reclaims old, worn-out roofs of every description by giving them a new top covering.

The Alleviation of Suffering. Williams Improved Stretcher Co., Wheeling, W. Va. Booklet. Pp. 8; 5 x 7 in.; illustrated. Describes an improved first aid and ambulance stretcher. The many improvements embodied in the design and construction of this stretcher have earned for it the title of "the most humane, portable, convenient and sanitary stretcher made."

Imperial Catalog No. 142. Imperial Brass Manufacturing Co., Chicago, Ill. Describes in detail the full line of Imperial welding and cutting equipment, and Imperial burning and lead-burning outfits. Reviews the history of welding and cutting and its relation to industry. Several different sizes of Imperial outfits are illustrated and described fully. The catalog will be sent free to any reader writing for it.

Industrial News

Charleston, W. Va.—Authority has been granted by the secretary of state to the Quaker Splint Coal Co. to increase its capital stock from \$25,000 to \$150,000.

Williamsburg, Ky.—The Star Gem Coal Co., of Williamsburg, has been incorporated with a capital of \$1000. George T. Vaughan, Mary E. Vaughan and Robert H. Davis are the incorporators.

Chattahoochee, W. Va.—The West Thacker Coal Co., of Williamson, has been organized and is planning for the immediate development of about 60 acres of coal lands, to have a capacity of about two cars daily.

Glen White, W. Va.—The E. E. White Coal Co. is considering plans for the erection of a new steel coal tippie at its plant to have a capacity of about 5000 tons of coal daily. The structure is estimated to cost \$150,000.

Pittsburgh, Penn.—The Petrolia Coal Co., of Kittanning, has been incorporated with a capital of \$50,000. The incorporators are A. L. Sheridan, John W. Robin, J. W. Fletcher, H. G. Gates, of Kittanning and William Leslie, of Parkers Landing.

Centralla, Penn.—The Lehigh Valley Coal Co. has awarded a contract for the construction of a new one-story coal washery to be located near Centralla, to cost about \$20,000. A. H. Ramberger, Girardville, Penn., is the building contractor.

Alger, Wyo.—The Amalgamated Development Co. has placed a contract with Roberts & Schaefer Co., Chicago, for the construction of its new reinforced-concrete tippie, to be built at this place, and which will include a Marcus picking table screen.

Cleveland, Ohio.—The Lincoln Bonding Co. has purchased outright and consolidated here the business, patents and good will of the Atlantic Welding Co., of New York City. The Lincoln Bonding Co. manufactures an electric bond-welding machine that is meeting with much favor in the coal fields.

Weston, W. Va.—The P. C. Lynch Coal Co. has acquired about 1077 acres of coal lands on Stone Coal Creek in Lewis County in addition to the 750 acres recently acquired on the Baltimore & Ohio R. R. between Weston and Gaston. The company is planning to expend about \$200,000 for the installation of the necessary equipment for development.

Columbus, Ohio.—For the first time in a long while wagon mines in the Hocking Valley along the line of the Hocking Valley railway were being supplied with open-top cars. This was in accord with an agreement by the railroad to furnish such equipment when cars for regular mines reached 100 per cent. of requirements.

Wheeling, W. Va.—Judge A. G. Dayton of the United States District Court has issued an order against the Elm Grove Coal Co. restraining that company from refusing to supply coal to the Wheeling & Elm Grove company on the ground that if the source of the fuel were stopped street car service would have to be discontinued.

White Star, Ky.—The White Star Coal Co., 120 Broadway, New York, has filed notice of an increase in its capital from \$120,000 to \$300,000, to provide for expansion. At the present time the company is developing approximately 1500 acres having a daily capacity of 1000 tons, and it is planned to increase the output to about 1500 tons per day within the next six months. W. L. Hammond is general manager.

Charleston, W. Va.—Clarksburg men are chiefly interested in a million dollar coal company just chartered by the Secretary of State to be known as the Mountain State Coal & Coke Co., which will operate mines and coke ovens in Athens and Morgan Counties, Ohio. The incorporators are H. W. Kopp, E. D. Tucker, Joseph L. Walton, J. H. McKelvy and B. E. Maxwell, all of Clarksburg.

Charleston, W. Va.—Shippers of coal in this district have been notified by A. H. Land, district representative of the United States Fuel Administration, that the order which provided that all coal mined east of Charleston must be shipped to the shipping board, has been rescinded and that operators are now free to ship their product anywhere within the zone into which they have been placed by the Fuel Administration.

Louisville, Ky.—At no time since automobile trucks came into use in the retail coal field have their advantages been as great as at the present time, when it is impossible to obtain drivers, men to store coal, unload coal, etc. Locally the retailers are making practically no effort to supply men for storing coal for customers, as all men that can be had are needed in unloading from cars and handling the delivery end.

Columbus, Ohio.—The Colonial Coal and Supply Co. has opened a new retail yard on Cleveland Ave. which is a modern plant in every respect. Storage capacity for 8000 tons has been provided. One of the features of the plant is a loading machine by which cars can be loaded from the storage pile for steam purposes. The plant occupies a tract of land 250 x 1000 ft. The equipment will be of sufficient capacity to unload or load 2400 tons in 24 hours.

Hellier, Ky.—The Allegheny Coal and Coke Co. has been bought up by the Peabody interests and is now known as the Manufacturers Coal and Coke Co. The new concern intends to build 200 rectangular coke ovens in addition to the 150 ovens now in operation. The Peabody company, one of the largest individual coal producers in the United States, has mines and virgin coal fields in the states of Illinois, Indiana, Oklahoma, Washington, Virginia and Kentucky.

Columbus, Ohio.—Activity at the docks of the lower lake ports is gradually increasing as the lake season gets under way. The Hocking Valley docks at Toledo loaded 117,249 tons and 2223 cars for the week ending May 18 as compared with 118,248 tons the previous week, making a total of 367,399 tons since the opening of navigation. The Toledo and Ohio Central docks loaded 64,000 tons the week ending May 17 as compared with 47,000 tons the previous week, making a total of 198,000 tons for the season.

Pittsburgh, Penn.—Declaring that the law of the nation must be upheld and that coal men and food men, together with other merchants affected by wartime legislation, should familiarize themselves thoroughly with the laws, Judge Thompson in the United States District Court on May 15 fined John E. Robbins and Frank H. Stewartson, local coal brokers, each \$500 for violation of the fuel act by selling above Government price. The defendants pleaded guilty and said they did not understand the order. The fines were paid.

Columbus, Ohio.—The State of Ohio is probably the only large consumer which has neglected to lay in its coal supply for the coming winter. But this is due to legal requirements, which prevents the Ohio Board of Administration to contract for any supplies before the money to pay for the supplies is in the treasury. The money for the fiscal year 1918-1919 will not be available until after July 1. At that time Purchasing Agent Lyons of the board will start contracting for several hundreds of thousands of tons for the 23 state institutions.

Charleston, W. Va.—The Big Hurricane Coal Co., a Wayne County corporation, with principal offices at Hubbardstown, was adjudicated bankrupt last week after a hearing before Thomas R. Shepherd, referee in bankruptcy. The hearing was brought on the petition of the Emmons-Hawkins Co. of Huntington, and other alleged creditors, who declared the company committed an act of bankruptcy in assigning certain tracts of lands and mining equipment to Randolph Bias, of Williamson. The company has been operating on Big Hurricane Creek in Wayne County.

Charleston, W. Va.—The Liberty Collieries Co. has been incorporated with a capital stock of \$150,000, the incorporators being Herbert Hannigan and S. G. Smith, of New Lexington, Ohio; C. A. Smith, of

Chillicothe, Ohio; M. E. Moore and C. H. Hetzel, of Charleston. The company has announced that it plans to specialize in the production of byproduct coal, having purchased a large tract of coal land on which it expects to start development in the near future. S. G. Smith, one of the incorporators, is auditor of Perry County, Ohio, and has other mining properties in which he is interested in this state.

Louisville, Ky.—Wiley B. Bryan, fuel administrator for Kentucky, in a recent report stated that the mines of Kentucky loaded out 5000 cars of coal more in April, 1918, than was loaded out in April, 1917, showing that consumers are stocking for winter requirements, or else the yards and steam consumers were generally short and laying in surplus stocks. However, if the mines have been able to produce that much coal over last year's production, it would go to show that the labor and car situation is somewhat better than it was at that time, although in the spring of 1917 the demand was somewhat off.

St. Louis, Mo.—At the first annual convention of the Mississippi Valley Waterways Association, held here recently, United States Senator James A. Reed of Missouri, the principal speaker at the convention, strongly urged the utilization of the Mississippi and other rivers in the transportation of coal as a solution of the car shortage. He said it was plainly the duty of the Government to increase the efficiency of the railroads and establish barge lines without counting the cost. The establishment of the barge lines, he said, would relieve the railroad congestion and the coal mines would be able to obtain the cars that they need.

Indianapolis, Ind.—The Indianapolis board of education has made a contract with the J. R. Morris Coal Co. of this city for the delivery of approximately 20,000 tons of coal for heating the school buildings of the city for the school year beginning in September. The price will be \$4.98 a ton, a total expenditure of practically \$100,000. The coal will come from the Tuxhorn mines at Keyes, Ill., and will be delivered first to a school coal yard to be established on property belonging to the school board between Wilkins and Ray Streets on the Illinois Central R.R. tracks. Later, it will be delivered to the school buildings as needed. The contract provides that all coal shall be in the yard by October.

Columbus, Ohio.—The Federal Fuel Administration is taking up the price question in all producing sections of the Buckeye State with the exception of Pittsburgh No. 8 vein. Last week W. D. McKinney, commissioner, and James Pritchard, secretary, of the Southern Ohio Coal Exchange, presented the cost figures from the Hocking Valley, Pomeroy Bend and Crooksville districts. J. L. Lawler and Edward Evans represented the Jackson district, and A. A. Augustus looked after Cambridge. The Federal Fuel Administration is figuring on a new system of computing costs of production and it may result in an entire redistricting of the state for price-fixing purposes. No decision will be announced for some time.

Kingwood, W. Va.—With a view to greater cooperation in securing a better car supply and to an improvement of conditions in general, the West Virginia Northern Coal Operators' Association was organized at a meeting held in the courthouse here at which a number of operators who have mines along the line of the West Virginia Northern Ry., which runs from Morgantown to Rowlesburg, were present. E. G. Smith, of the Inland Fuel Co., was selected as temporary chairman and presided during the election of the following permanent officers of the association: A. T. Carnahan, of the Deaker Hill Coal Co., president; Guy Bonafield, of the Loubert Coal Co., vice president; E. G. Smith, assistant secretary and treasurer.

Madison, Wis.—The University of Wisconsin has issued a bulletin prepared by the Bureau of Municipal Research upon the general topic of municipal coal yards, with suggestions for their erection and operation. Oshkosh is the only city which has made appropriation for a coal yard, but Kenosha, Madison, Sheboygan, Eau Claire, Fond du Lac, Green Bay, La Crosse and Racine are also interested. Ashland built a temporary coal yard last winter when the situation became acute, and Eau Claire did the same. Marinette started a municipal wood yard as a fuel relief, and Wausau has taken certain steps toward municipal sale of coal. In all, 30 cities have been interested in one way or another in the supply of fuel as a municipality, and the bulletin sums up the experience of these 30 cities.

MARKET DEPARTMENT

Weekly Review

Coal Production Now Near Maximum—Must Conserve High-grade Fuel for Use of Essential Industries—Labor Situation Serious—New England Outlook Gloomy

WITH an increase in the number of empty cars furnished by the railroads, the bituminous mines shipped 11,806,000 net tons of coal during the week ended May 11—a showing slightly better than was made during the record week ended Apr. 27. Telegraphic reports indicate that for the week ended May 18 the output of soft coal bids fair to pass the 12,000,000-ton mark. Anthracite shipments for the week ended May 11 totaled 38,314 cars, a decrease of more than 5 per cent. when compared with shipments the week preceding.

The foregoing figures show nearly maximum production. But even if continued at this rate for the rest of the year, the country will still be faced with a fuel shortage unless immediate steps are taken to conserve every single ton. Railroads, power plants and other consumers that formerly burned high-grade coals should readjust their equipment and use the coals allotted their respective districts by the Fuel Administration, even if the coals so available are of an inferior quality. Only in this way will the vitally essential bunker, metallurgical and by-product demands be met and the domestic requirements be satisfied. Fur-

thermore, it is becoming more and more apparent that plants other than those directly at work on supplies to aid in winning the war will receive little consideration so far as fuel is concerned.

The question of labor is now one of paramount importance. Sadly depleted by the draft and the return of many of its workers to the farms, the coal-mining ranks are being still further demoralized by the enticing appeals of war industries. Working on a cost-plus basis, munitions plants and shipyards offer almost any wage in order to get enough men. It would be well for the Government to put a stop to the havoc and labor unrest being wrought by this system in the coal fields. Otherwise we will be confronted by a shutdown of industries due to lack of coal that will make "fuelless Mondays" appear a godsend in comparison.

The railroad fuel question remains unsettled. Another month will see the termination of nearly all contracts for railroad coal, and both railroad purchasing agents and operators are in a quandary over what course to pursue.

Market conditions are strong and active in every way, with the demand for coal for storage purposes sufficiently large to take care of all the

available fuel. While early in the season it was proposed to ship no domestic sizes of anthracite to manufacturing plants, it has already become necessary to make exceptions to this to the extent of over 2,000,000 tons for war work. The allotment for cantonments is also sure to be enormous, and probably much larger than at first considered necessary. It would be well, therefore, for domestic consumers who have not already done so to order their coal immediately, if they wish to make certain of getting a supply before cold weather.

Coal shipments into New England are falling down at the rate of about 20,000 tons a day. The railroads are doing all they can, and only by shipping more coal by water and the strictest kind of conservation will a fuel famine be averted in this highly important manufacturing section next winter.

The movement of coal to most of the lower Lake ports, for forwarding to Northwestern points, has reached a good volume. The ore movement is increasing also under the influence of a better coal movement. Practically all Lake shippers have now received their permits and are ready to go ahead in earnest.

COAL PRODUCTION

The continuation of favorable operating conditions, both of transportation and mining, during the week of May 11, are reflected in the production of coal, which gained 2.2 per cent. over the week of May 4 and exceeded slightly the record week of Apr. 27. The total production in the week of May 11 is estimated at 11,806,000 net tons, or an average per day of 1,968,000 tons, compared with 1,926,000 tons in the first week of May and 1,829,000 tons in May, 1917. Preliminary estimates place the

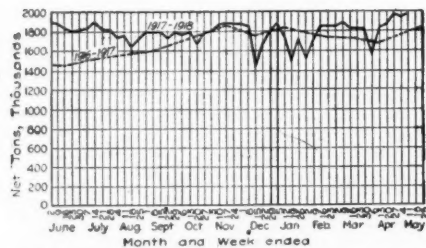
ous week, failed to record any material improvement. The principal operators in the Connellsville and adjacent districts of Pennsylvania report production of 388,395 net tons of coke. The ratio of tonnage produced to maximum capacity was 74.1 per cent. as against 70.4 per cent. the week of May 4 and 75.2 per cent. during the week ended May 11. The same operators shipped 140,150 net tons of coal.

Byproduct Coke—Operators of byproduct coke plants report production during the week ended May 11 at 89.2 per cent. of

constant, the former at 4.5 per cent. of potential capacity and the latter at 0.3 per cent. Pennsylvania was the only state to report a material decrease, caused as previously stated by labor shortage, and these operators continue to report the least favorable conditions, operating at only 77.1 per cent. of their capacity. Considerable improvement is reported by Alabama, Kentucky and Maryland operators. Increased production of the operators in the two states first named is attributed to repaired plants, while the cause of the improvement in Maryland was not reported.

Dry Goods Economist—The between seasons period now setting in finds many branches of the textile industries welcoming a breathing spell. The wool and worsted goods manufacturers are waiting to learn what quantities of raw materials will be left for them when the needs of the Government are finally determined. Cotton is still in ample supply, with prices of short staple fully 10c. under levels of two weeks ago. Fine cotton, such as is needed in the making of most dress fabrics, is not so plentiful, as is shown by the fact that prices have only receded 2½ to 3c. per pound. Linen is practically out of the reckoning for the time being.

Bradstreet's—Growth in war business, broader demand for civilian goods, improved retail trade, further ease in transportation, and excellent crop reports stand out as the principal factors in a budget of encouraging news. But governmental operations, ranging from the construction of ordinance plants, ships and warehouses down to the buying of the most common products, figure to a greater extent than heretofore. As the Government buys, as it continues to commandeer goods in being or in prospect, various kinds of supplies for non-militant consumers necessarily grow



week's production of beehive coke at 655,000 net tons, as compared with 647,000 during the week of May 4. The average daily production is estimated at 109,000 net tons, an increase of 1000 net tons per working day over last week. Improvement in transportation and better market conditions was reported for the country as a whole, although such improvement was partly offset by shortage of labor.

Beehive Coke—Repairs to plants effected a material improvement during the week ended May 11 in production of beehive coke. The yard labor situation, however, which limited production during the previ-

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

Week Ended
Apr. 20 Apr. 27 May 4 May 11

Bituminous shipments, 123 roads. 193,667 204,527 202,558* 207,159†
Anthracite shipments, 9 roads. 39,130 39,522 40,570* 38,314†

* Revised from last report. † Subject to revision.

Anthracite shipments declined from 40,570 carloads during the week ended May 4 to 38,314 carloads during the week of May 11, a decrease of over 5 per cent.

maximum capacity. The ratio of production to maximum capacity was lower than during the preceding week, and the slight decline is attributed to labor shortage at the Bethlehem steel plant at Northampton and the Cambria steel plant at Johnstown. The shortage of labor at these plants caused losses of potential capacity for the country as a whole to rise from 0.6 per cent. the week ended May 4 to 2.3 per cent. Losses attributed to lack of coal declined from 3.7 per cent. to 2.8 per cent., and losses due to repairs to mines and "no market" remained

scarcer. In short, the country's movements are being adjusted to a true war basis, and with few signs of friction.

American Wool and Cotton Reporter—Little activity is seen in the woolen goods market. Interest is largely centered in what will happen to civilian contracts now held by mills. Production is largely for Government requirements and prices are being regulated, not by the supply, but by the Government. In the cotton goods market there has not been the tendency towards a decline that there had been previously, and a much steadier tone of buying and selling has been in evidence. The outlook is uncertain. The market is in the balance and probably will continue so until some definite change in fundamental conditions.

The Iron Age—The most serious factor in the situation is the loss of three months' time in the placing of locomotive and car orders—a delay costing the Allies thousands of tons of steel that by no possibility can now be delivered in 1918. Some of the steel for the new cars has been allocated this week, including 135,000 tons of plates to the Steel Corporation. The total of plates, shapes and bars for cars is 922,110 tons, deliveries to be made in 120 days, beginning June 20. Important among the price adjustments announced on May 21 was a \$6 per ton advance on cast-iron water pipe, a reduction of 25c. per 100 lb. for structural and ship rivets and 15c. for boiler rivets (a differentiation now being made) and a reduction of about 5 per cent. on smaller rivets. Copper-bearing low-phosphorus pig iron was advanced \$2 per ton.

Atlantic Seaboard

BOSTON

Output continues disappointing. Car supply and railroad fuel questions still unraveled. Manufacturers not on preference list most anxious over outlook. Renewed efforts to close contracts on water coal, but those not already "covered" all-rail are discouraged. District representatives have hands full. State administrators busy lining up "requisitions." "Storror coal" all-rail order not yet renewed. Hampton Roads coal not in even supply at piers. Boats still short. Some Lake-built steamers begin to arrive. Market for coke has bearing on West Virginia output. Latter likely to fall short of 1917. Whole situation beset with difficulty. Receipts by water quite irregular, and yet Washington wonders why coal is consigned all-rail to points adjacent to Tidewater. Anthracite deliveries continue to show falling-off as compared with a year ago. Large movement of steam sizes and a noticeable favoring of water shipments to Maine ports.

Bituminous—Notwithstanding the rosy reports that issue from Washington summarizing output all over the country, the regions from which New England draws the major part of its supply are steadily falling behind last year's marks. There have been days lately when car supply in central Pennsylvania showed real improvement, the proportion placed for general commercial purposes, including preferred industries, having risen to something over 50 per cent. It can no longer be urged that a New England "priority order" is chiefly to blame for the small tonnage available.

There is a new drive now upon the New River and Pocahontas agencies to get commitments on water coal. Those shippers who have not sold all the tonnage they are hoping to get are being besieged to take on new business. The line is very closely drawn, however, and those factors who own their own wharves and boat facilities have practically ceased making sales. Others who are partly or wholly dependent upon bottoms on trip-to-trip charters are careful not to undertake orders until the coal is definitely en route to the discharging point here. Instances multiply where industrial buyers are unable to make any arrangement either by rail or water, and to this small army of the "uncovered" should be added a large number of others who have contracts but are getting only small deliveries.

The volume of coal at the Virginia terminals continues quite uneven. Days there are when coal is not on hand to load boats, but generally speaking there are more instances of coal waiting for vessels than of vessels waiting for coal. Under the joint pool arrangement now in force a shipper having ample credits at one pier or another is permitted to draw from the supply at a pier other than where it would usually be furnished. This has led to misunderstanding among some of the coal people, especially when the present relative prices of Pocahontas and New River show a dif-

ferential of 35c. The shortage of boats is still a great factor in making buyers consider seriously all suggestions for decreasing the quantities consumed. Not only did representatives of the Shipping Board scale down Mr. Storror's estimate of the coastwise tonnage needed, but actual receipts of coal are far short of the smaller amount they fixed. At times a whole week goes by without a single cargo being available at Boston for distribution inland. Rehandlers who took contracts and made their estimates on the basis of steamers and barges then in hand are not getting coal in the volume expected, and there is much anxiety on the part of some of the largest steam users, who had reason to think their needs for the present at least would be comfortably supplied.

The first of the new lake-built 3000-ton steamers are now reaching here with cargoes of Cape Breton coal. This will help slightly, but not more than 100,000 tons can be counted on in this way; and this is really a much smaller tonnage when the quality of the coal is taken into account. The cargoes have been placed mainly with large plants at points adjacent to Searsport, Portland, Portsmouth and Boston, and probably in every case the coal will be turned in for immediate use.

The strong demand for coke has an important bearing on the output to be expected from the smokeless fields in West Virginia. Particularly is this true of Pocahontas operations, where years ago coke ovens were installed on a liberal scale for the purpose of increasing the car rating for individual mines. With the present authorized price of coke, to make a ton of which requires only 1.6 tons of slack, every ton of the latter so used will show the operator an extra profit of \$2 per net ton over the fixed price for slack when shipped as commercial coal. The result is a big decrease in the volume of shipments from certain mines, a decrease which will spread to other operations sufficiently equipped with coke ovens. It almost seems as if this item should be given attention before too much tonnage is lost. While coke has got to be had for blast furnaces, yet it is easy to see how coke production in some districts can be overdone.

Another subject calling for prompt treatment at the hands of the fuel authorities is the order allowing a premium on coal "mechanically cleaned." The present regulation is much abused and a lot of unfairness results. Operators who need picking tables to make the coal merchantable are collecting the premium while others who have always been able to keep their output clean through rigid inspection and hand-picking are denied the bonus. And both coals are pooled when shipped to tidewater!

Certainly the present state of the trade is alarming for New England. In no direction is there hope of adequate service. The areas ordinarily served almost wholly by water-borne coal would show shutdowns in considerable number were it not for the volume of coal coming all-rail that at present is just about enough to make up the shortage at tidewater for current consumption, but far behind what is needed to give a reserve for increased consumption and diminished receipts next fall and winter. And yet the regulating power in Washington continues to speculate just where an imaginary line should be drawn between an all-rail "zone" and a tidewater "zone." Surely if the central Pennsylvania district, for instance, is to cut down even the smaller quotas furnished for New England in 1915 and 1916 we have a hard time ahead of us.

A sign that the Fuel Administration means business is a recent circular sent through district representatives to operators and shippers. The latter are required to make shipments to industries on Preference List No. 1 and on requisitions issued from Washington or by the district representatives until such industries and individual plants that are on Preference List No. 1 are supplied with the necessary coal. Shipments going forward outside of the above classifications will be diverted and re-consigned.

Anthracite—While anthracite receipts all-rail are keeping up measurably well with the volume of the last three weeks, the showing is still unfavorable as compared with corresponding weeks in 1917. About 30 per cent. continues the proportion of steam sizes as compared with domestic. By water the tonnage shipped from Philadelphia and New York begins to show the result of instructions to favor eastern ports, particularly those on the Maine coast. While there is much pressure on retailers, the attitude of the latter is perhaps a shade more hopeful than a month ago.

Rates on certain anthracite-carrying barges from New York to Boston, and owned by anthracite shippers, were advanced May 11 from \$1 to \$1.50, making this rate the same as on anthracite in Reading barges from Philadelphia.

NEW YORK

Shipments of anthracite far below requirements, but dealers are optimistic. Sufficient orders booked to keep them busy for months to come. Appointment of Mr. Wiggin's successor urged by trade. Coal men and merchants confer. Trade urges retention of men in mines. Car supply improves in bituminous fields, but labor is short.

Anthracite—There has been practically no change in the movement of coal to this market, and while two months of the coal year are almost over and conditions serious, there is an optimistic feeling among most of the trade that there will be plenty of coal to go around between now and October.

The appointment of a successor to Albert H. Wiggin, who resigned as state fuel administrator a few weeks ago, is being urged by local coal men. Several names have been suggested, among them Reeve Schley, fuel administrator for New York County, Harry T. Peters, of Williams & Peters, who was chairman of the State Fuel Conservation Committee under Mr. Wiggin, and Wilber A. Marshall, of Marshall & Co.

Several conferences have taken place the past week, all looking toward securing for this city a sufficient supply of coal. One was a conference in the Chamber of Commerce attended by members of that organization's committee appointed to look into the coal situation, and several members of the trade, among whom was J. B. Dickson, of Dickson & Eddy, who is a member of the Anthracite Committee of the United States Fuel Administration.

Shipments during the week ended May 11 show a decrease of 2256 cars, or 5 per cent. over the preceding week. This decrease is reflected in the dumpings at this port for the week ended Monday, May 20, when 6346 cars were dumped as compared with 7546 cars for the week ended May 13.

With shipments prohibited to 24 states, it is expected that receipts here will gradually increase. However, until more bins are filled and the public is assured that there need be no anxiety regarding coal for next winter, dealers expect a steady demand.

Egg and stove are the sizes most wanted, and consequently the shortest in stock. Many householders use no other size and the result is that while dealers are able to deliver either chestnut or pea, they have none of the other larger sizes.

Buckwheat No. 1 is nearly as scarce as the larger coals, but rice and barley are easy with prices being held tight, except on some of the cheaper grades.

Current quotations, per gross ton, f.o.b., tidewater, at the lower ports are as follows:

	Circular	Individual
Broken.....	\$6.15	\$6.90
Egg.....	6.05	6.80
Stove.....	6.30	7.05
Chestnut.....	6.40	7.15
Pea.....	4.90	5.65
Buck.....	4.45@5.15	4.80@5.50
Rice.....	3.90@4.10	3.80@4.50
Barley.....	3.40@3.65	3.00@4.00
Boiler.....	3.65@3.90	

Bituminous—An improved car supply has not had an appreciable effect on local conditions. Demand continues far ahead of supply and the desire to get coal remains strong. Free coals are scarce at this port and what is to be had is said to be the inferior grades.

A serious condition exists in the bituminous mines with regard to labor. Workers are scarce, and even with the improvement in cars operators find it difficult to increase their output sufficiently to load the cars given them. It is fast becoming apparent that something must be done to induce the men to remain at the mines, otherwise operators believe the shortage next winter will be greater than it was last.

While production figures for the week ended May 11 show an increase of 252,000 tons, or 2.2 per cent. over the previous week, the dumpings at the local docks for the week ended May 20 were 6625 cars as compared with 6484 cars for the week ended May 13, an increase of 141 cars.

The local trade is eagerly awaiting a decision from Washington as to railroad fuel. Another month will see the termination of nearly all contracts for railroad coal, and the trade is desirous of knowing if the railroads will be permitted to get their fuel at prices below what the general public will be asked to pay.

Delay in shipping coal from the mines to tidewater is complained of by some shippers who handle good grades of bunker fuel. This delay, they say, in many instances causes them heavy losses owing to the failure of the railroads to forward cars promptly. When the coal does arrive it

may be that the vessel for which it is intended has already sailed, or is about to do so. Then it becomes necessary for the shipper to seek another customer while the coal may have been loaded into a barge, which results in additional costs to the shipper.

BITUMINOUS PRICES

	F. o. b. New York	Mine Price Gross	Net	Gross
Central Pennsylvania.....	\$5.06	\$3.05		\$3.41
Maryland:				
Mine-run.....	4.84	2.85		3.19
Prepared.....	5.06	3.05		3.41
Screenings.....	4.50	2.55		2.85

PHILADELPHIA

Anthracite shipments not up to expectations. Customers clamor for coal. Rail movement expedited by freight embargo. Domestic coal for manufacturing. Labor supply decreasing. Operators quizzed on shipments to utilities, etc. Steam coal all taken. Bituminous shows some improvement. Cars still short. Some stocking by plants. Coke price increase rumored.

Anthracite—With the big companies making heavy consignments to New England, the Philadelphia trade is naturally being neglected for the present. During April the market received close to its full quota or one-twelfth of its proportion, based on the 1916-17 receipts. The dealers fully expected as much or more this month, but judging from the present outlook the tonnage will run behind locally. The shippers, especially the larger ones, appear strong in their determination not to exceed their allotment in any case, and for the present at least the dealers who receive that much are considered as having received fair treatment.

The embargoes on domestic freight which became effective the middle of the week it is believed will greatly aid in the delivery of coal after it leaves the mines. This will be a big relief, as for the past two months the notice of a shipment meant little to the dealer, as he had no idea when to expect the coal.

At a meeting this week of the anthracite distribution committee and those most interested in that work, including a representative from Dr. Garfield's office, it was learned that while early in the season it was proposed to ship no domestic sizes of coal to manufacturing plants, it has already become necessary to make exceptions to this to the extent of over 2,000,000 tons for war work. The allotment for cantonnments is also sure to be enormous and probably much larger than at first considered necessary.

It has been proposed to ship New England's quota for twelve months during the next nine months. This would mean a repetition of the plan suggested last winter, when because of this city's proximity to the mines it was presumed this market could be cared for almost overnight. It may be that the expected increase in the railroads' equipment, both in cars and engines, would by that time prevent a repetition of last winter's troubles, or at least lessen the severity. It must be said that those close to the situation here profess little optimism as to the future and can see only a season of discontent ahead.

All shippers of anthracite have recently received a communication from the Fuel Administration at Washington in reference to shipments to public utilities and certain essential manufacturing industries. The operators are directed to furnish a list of orders of commitments made with any gas company, manufacturing plant or public utility for the year from Apr. 1, 1918, as well as a similar list giving shipments as made in the year from Apr. 1, 1916. With the latter a list of plants is given and to these concerns the operators are directed to continue shipments without fail.

Gradually new freight tariffs covering anthracite coal are reaching the shipping offices. Practically most points outside of the state are now covered and recently tariffs have been coming in showing increases to nearby points. These increases are in accordance with the ruling of the Interstate Commerce Commission some months ago granting a raise of 15c. a ton. It was thought by some that this increase would not affect the rates within the State of Pennsylvania, but they are now becoming awake to the fact that the above commission has the power to make a general increase in rates regardless of the various state commissions. Up to this time the rates to points in strictly Philadelphia territory have not been increased, but there is no doubt that these tariffs will be received in a very short time. The first notice that many dealers had of the new rates was when they received their freight

bills from the railroad company. Of course, all this adds to the retail price of the coal, and it is somewhat difficult to convince the consumer at times that the increasing cost of coal is justified.

In the steam-coal trade there is very little free coal to be had and every car of whatever size soon finds a buyer. It is noticeable throughout the city that heavy users of steam sizes are beginning to accumulate fair stocks of the small sizes, especially rice, and numerous vacant lots have been rented for this purpose and coal is rapidly pouring in.

The prices per gross ton f.o.b. cars for line shipments and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$4.90	\$6.05	Buckwheat..	\$3.15	\$3.75
Egg.....	4.50	5.70	Rice.....	2.65	3.65
Stove.....	4.75	6.05	Boiler.....	2.45	3.55
Nut.....	4.85	6.10	Barley.....	2.15	2.40
Pea.....	3.45	4.35			

Bituminous—It is difficult to give an accurate statement as to the soft coal trade. Of course, the operators still continue to cry for more cars. We are inclined, however, after a careful canvass of a number of shippers, to the opinion that conditions are improving. Of course, in a way, this is more or less of a general statement and is predicated a good deal upon the quantity of coal one sees upon the tracks these days. Utility plants in particular seem to be faring quite well just now and are putting away good stocks of fuel in excess of their immediate requirements. Quite a good bit of coal is being received in box cars, which would indicate that shipments in this district from wagon mines are growing, as the other mines are not allowed to load box cars in this direction.

BALTIMORE

Bituminous supplies here fairly easy. Anthracite dealers complain of poor receipts, while official fuelholdm urges consumers to buy at once.

Bituminous—With official Washington undoubtedly fearing a serious coal famine the coming winter, and issuing statements apparently intended to prepare the public for trouble ahead, Baltimore and the surrounding district for the time being is in fairly good supply of soft coal. Diversions here to clear railroad congestion at Cumberland and other points west brought the first element of relief to a rather strained situation, and since that time there has been enough natural flow at tide for all lines to enable a pretty fair distribution to industries here. There is no extra supply of coal on hand. Few industries have any stocks ahead of the time when the next shipments should be due.

Anthracite—All the hard coal dealers here are complaining of poor receipts. Official Washington is urging consumers to order early and insist on early deliveries, and this is being backed by the fuel administrator here. One prominent dealer here said he had more business on his books already than he could possibly supply by October, and that it was useless for him to book more at this time as he could not promise the coal. Many persons have appealed to the Baltimore Coal Exchange, saying they can not get promise of deliveries from dealers. All are being told to place their orders and wait their turn; that their dealers will deliver two-thirds of their orders as soon as they can get the coal. Small dealers especially have been hit by light arrivals recently, and their customers have been the most clamorous for relief.

Lake Markets

PITTSBURGH

Record production in district. Car shortage not serious. Open market for coal.

The Pittsburgh district shared fully in the rise in production reported by the Geological Survey for the week ended May 11, the record week for the country thus far, and conditions since then have improved a trifle more. The Pittsburgh district is easily shipping more coal than ever before in its history. A considerable contribution is made by the river mines, which are getting out a large tonnage, but the railroad mines are also doing well.

Car shortages averaging 15 to 20 per cent. are reported, but the trade is not disposed to regard it that production is actually restricted by this amount by car shortage, for while the supplies run under ratings by that amount it is far from clear that the mines would be able to load cars equal to their ratings in all cases. Indeed, some operators frankly admit that they

could not load any more cars than they are receiving, though in most cases they attribute the difficulty to labor shortage.

There is now a fairly open market for Pittsburgh coal, there being a moderately large tonnage of free coal offered openly. As a rule this is taken up by brokers, who are doing a satisfactory business. Their turnover is not so large as it was a year ago, their margin per ton is somewhat less, and there is more work involved in putting through transactions; still the comparison with pre-war conditions is extremely favorable. In the case of Pittsburgh coal there is practically none offered at below the set prices, even to jobbers, and the jobber obtains only the 15c. allowed him, and receives it from the ultimate buyer. In the case of Ohio coal there are occasional offerings at less than the set prices, but not to such an extent that the broker could make more than 15c. a ton, as to do so he would have to buy at more than 15c. below the set price and sell at a correspondingly higher figure.

An open market is quotable at the set maximum prices, \$2.20 for slack, \$2.45 for mine-run and \$2.70 for screened coal, plus 15c. in the case of coal sold by brokers.

BUFFALO

Receipts of bituminous slowing up. Still too much of it in Canada. Eastern embargoes hold up movements badly. Anthracite normal by Lake. More wanted locally.

Bituminous—It is generally held that the production is not much in excess of consumption, if it is equal to it, and yet jobbers find that consumers are holding off as soon as they get a moderate supply. It is again reported that Canada is pretty full of coal. Shippers have paid so much demurrage that they are more cautious, but they still manage to get a big supply across, mostly because they cannot sell it readily here. Locally the situation is easy. Consumers can get what they want without much difficulty.

The Government prices of bituminous continue without evasion, so far as can be observed, being \$4.45 for all sizes of thin-vein Allegheny Valley, \$4.25 for Pittsburgh lump, \$4 for Pittsburgh mine-run and \$3.75 for Pittsburgh slack, all per net ton, f.o.b. Buffalo.

Anthracite—The main new feature of this branch of the trade is that lake shipments have again gone above the 100,000-ton mark, where the movement ought to stay till the upper lake ports get as much as they need. All of our water shippers who are commonly active through the season are now loading vessels, and they will no doubt go on as usual. There are several occasional shippers, but they did little or nothing last season and they may not enter that branch of the trade now. It will all depend on the amount of coal they get out and how heavy the eastern demand turns out to be.

The local demand continues heavy, so that the authorities have to parcel out the coal in small lots as it comes in. Some of the more calculating people think it would be better to give everybody a full winter's supply as fast as possible and take them off the list. As it is now, with only a partial supply distributed everybody is trying to get more. The size is nearly all chestnut. How big furnaces are to burn it is not explained.

Lake shipments for the week were 101,500 net tons, of which 44,050 tons cleared for Chicago, 29,100 tons for Duluth and Superior, 3700 tons for Hubbell, 3500 tons for Green Bay, 3200 tons for Lake Linden, 14,300 tons for Milwaukee, 2200 tons for Sheboygan and 550 tons for Marinette. Rates were \$1 to Marinette, 60 and 65c. to Chicago, 55c. to Milwaukee, 50c. to Sheboygan and Green Bay, 48c. to Duluth, 45c. to Hubbell and Lake Linden.

DETROIT

With steam coal supply fairly plentiful there is a deficiency of domestic, both bituminous and anthracite. Lake shipments diminish.

Bituminous—There is a comparatively free movement of steam coal into Detroit, according to local jobbers, who qualify this statement with the explanation that the larger part of the coal of this description received here is mine-run. Nut, pea and slack sizes are included in the receipts, but in each case the quantity is small. This is especially so as regards slack. The expectation that slack would be provided in larger amount with the opening of navigation on the lakes is not being fully realized.

There is a marked deficiency in supply of domestic sizes of bituminous. Whether this is the result of shipments of such coal to ports at the head of the lakes is not quite clear. Retail dealers complain they are experiencing considerable difficulty in covering their requirements for lump, suitable for household use.

Anthracite—No improvement in supply of anthracite has developed during the week. Shipments received by dealers are small and wholly inadequate for filling orders from customers. Practically none of the retail yards have more than a few tons on hand and most of them are declining to accept orders for later delivery.

Lake Trade—Instead of increasing in volume the lake movement of coal appears to be shrinking. About 100,000 tons a day is the average loading and the bulk of the traffic is handled by contract carriers. Small freighters, operating without contract, find cargoes difficult to find. One result is that many ships are making the upbound trip without cargo.

COLUMBUS

Activity in mining is gradually increasing with a better car supply. Demand is strong all along the line.

The coal trade in Ohio has continued strong and active in every way during the past week. Production was larger than in former weeks, and the movement generally was good. Retail demand continues strong and the same is true of steam sizes. The lake trade is gradually increasing. With a continuation of the better car supply it is believed that production will be kept at a high level. Prospects are for continued activity in every department of the trade.

The retail trade is now attracting considerable attention from producers and distributors. While the lake trade is taking a considerable tonnage from the retail trade, still a large tonnage is going to retailers. Dealers are anxious to accumulate stocks in order to take care of the heavy retail demand. Consumers are heeding the campaign on the part of the Fuel Administration to buy now for next winter, and consequently dealers are busy. Consumers are not waiting for the fancy grades but are taking any variety available. It is reported that little Pocahontas is expected to arrive in this territory. West Virginia splints are coming in better, but the amount is not so large as in previous years.

Steam business is active, as larger users are again trying to stock up to guard against a shortage if an increased tonnage goes to the Northwest. The smaller users are also showing a disposition to stock up. Consequently all steam grades are quickly snatched up, and there is no surplus mine-run on the market. Railroads are taking a larger tonnage.

The lake trade is active and all lake shippers are rushing a large tonnage to the lower lake ports. Loading machinery is busy and vessels are moving smoothly. The ore movement is increasing also under the influence of a better coal movement. Practically all lake shippers have now received their permits and are ready to go ahead in earnest.

The output in Ohio districts is increasing to a nice extent. This is especially true of the Hocking Valley section, which is producing about 90 per cent. of the average. In the Pomeroy Bend district the output is also large, and the same is true of Crooksville and Cambridge. In eastern Ohio the car supply is better, but there is still a serious shortage and the output is estimated at 80 per cent.

CINCINNATI

Maximum activity prevails in connection with supplying storage demand and forwarding coal to Lakes, this movement being very heavy.

With a good car supply and a correspondingly increased production, there is still hardly enough coal coming forward to take care of all the demand which now exists, since the movement to the Lakes for forwarding to Northwestern ports has reached a good volume. The usual situation, in which virtually all of the coal passing through this point during the late spring and early summer months was permitted to go onto the Lakes, does not now exist, as the demand for coal for storage by local consumers, both industrial and domestic, is sufficiently large to take care of all the available fuel for some time to come. However, the trade is taking its time in the matter of supplying this demand, and while deliveries for storage are increasing in volume, it is felt that as there are several months in which to satisfy the requirements of consumers for storage there is no cause to worry. Whether there will be difficulty in future in making up the deficit which now exists in the matter of production as compared with total requirements is another matter. Distributors feel that they are handling the situation now as well as possible, and that if the volume of coal moved forward from the mines can be increased as the season advances there will be no difficulty in caring for the demand from all quarters.

LOUISVILLE

All coal a little long, with exception of domestic. Steady demand for domestic for stocking purposes, with retailers unable to secure surplus yard stocks.

The general demand for all grades of coal is fair at this time, but steam coal has not been so active as domestic coal, which is moving much better than ever known at this time of year. However, operators are having no difficulty in disposing of mine production.

In the eastern Kentucky district the car supply has improved materially, and mines are now getting about 80 per cent. of their car requirements. However, the mines are not able to operate more than 50 per cent. full time, due to the shortage of labor, which is being intensified by the draft and the agricultural demand. The use of farm tractors has relieved the agricultural demand to some extent, but with improved weather conditions many men have deserted the mines for work in the open fields.

BIRMINGHAM

Domestic and steam coal demand active. Heavy tonnage required by the railroads menaces supply for industrial plants. Brokers besieged with orders which they are unable to handle. Production badly off, which makes the situation more tense.

The shortage of coal to supply the demands on the local market is the most serious factor in the situation here—which applies to both the domestic and steam product.

Domestic dealers are clamoring for shipments and are only getting about half the tonnage they desire, which is being promptly distributed to their customers, in some instances being loaded direct from the cars into the wagons. All sections of the zone are making insistent requests for coal, and the output of the domestic mines is being prorated over the whole territory. However, one reassuring feature is that every consumer that possibly can do so is laying in coal for next season's use. Dealers cannot see far ahead in respect to the amount of coal they are to receive from the mines, as few contracts have been made, shipments being made principally on verbal understandings covering a limited period.

All rail lines in this district are drawing heavily on the coal supply, particularly the Southern and Louisville & Nashville, claiming the full tonnage taken is used in current operations, no effort at stocking being made. The Southern's quota is 46.84 per cent. of the output of the mines on its lines, aside from operations of furnace companies and strictly domestic producers. During the past week cotton factories, which are quite numerous in this zone, were added to the priority list. Brick plants and other less essential operations are receiving a restricted supply.

Coal production is not satisfactory, complaint being general that miners and mine workers are showing a disregard for regularity at work, which is seriously curtailing the output. Increased wage schedules, as in the past, have not proved a panacea for this ill.

Coke

CONNELLSVILLE

Slightly increased shipments. Less complaint of car shortage. More Conneltsville coal to be shipped. Iron industry fairly well supplied. Little coke surplus for open market offerings.

There has been only a slight increase in the shipments of Conneltsville coke, but there has been a larger increase in the shipment of Conneltsville coal, partly against new byproduct coking operations about to begin operations. While there remains much complaint as to car shortage, there is less than there was, and there is more complaint about labor shortage, particularly along the line that now that the men are offered more steady work they take more days off, as they can spare the money. Two or three months ago men were hanging around the works in hopes that cars might come in and give them work, while now some of them do not report when work is assured.

On the whole coke conditions are rather satisfactory as compared with conditions up to a few weeks ago. This is reflected in the operation of blast furnaces, as practically all the furnaces in blast are receiving adequate supplies and are operating at capacity, the only curtailment in pig-iron production being through a few furnaces remaining out of blast waiting for coke to accumulate.

It has become fairly clear that Conneltsville coke production is unlikely to increase

materially over the rate of the past few weeks, say 325,000 to 350,000 tons a week, but there will be increases in the coal shipped to byproduct operations. The production of coke in the United States in the ten weeks ended May 11 was at the rate of 10 per cent. above the rate in 1916, while the present blast furnace capacity is only between 10 and 15 per cent. in excess of the actual pig-iron production in 1916, from which it follows that with a slight further increase in coke production, with the diversion of as large a proportion of the coke to blast furnaces as formerly, which of course is to be expected, and with coke of as good quality as formerly, the iron and steel industry should be fully supplied with coke.

Shipments continue to be rather fully taken up by contracts, but some furnaces are reaching a point where they are disposed to have shipments under contract curtailed somewhat, and in the course of time this may result in general offerings in the open market. At present such offerings are rather exceptional. The market is quotable at the set maximum prices: Furnace, \$6; foundry, 72-hour selected, \$7; crushed, over 1-in., \$7.30, per net ton at ovens.

The "Courier" reports production in the Conneltsville and Lower Conneltsville region in the week ended May 11 at 341,110 tons, an increase of 7655 tons.

Buffalo—The supply is light and is obtained mostly from the ovens direct. If any is controlled by jobbers here it goes to Canada, where a commission is allowed. In fact the trade is not restricted there, so the supply is rather good. Shippers say that quite an amount of coke-ash siftings is coming this way. It is fit for nothing but to mix with coal for making steam. It is sometimes so low in value that it has to be sold to the railroads at very little more than the freight. Furnaces are running actively and ore is coming in freely by lake.

Birmingham—Coke market conditions are ideal so far as the demand for the product goes, but the supply during the past week or so has been crippled by labor shortage and other operating disabilities. One of the larger foundry-coke producers reported his output about 40 per cent. off; others much under normal. Transportation facilities are now good and ample cars are being furnished for both district and foreign use.

Middle Western

GENERAL REVIEW

Car supply shows some improvement, but miners fail to respond to their opportunities.

In most sections of the Middle West there was an improvement in the supply of equipment during the past week, but miners failed to avail themselves of the opportunity to increase production. Semi-monthly pay day occurred on Wednesday the 15th, and the fact that the miners are now making more money than ever before causes many of them to support the saloon without regard to the country's needs for higher efficiency in coal production. The immediate stopping of the sale of intoxicants would measurably increase coal production, and also render a beneficial service to both the miners and their families, reduce accidents to the lowest possible unit, and redound to the good of the public generally.

Market conditions continue to be satisfactory on all grades with the exception of No. 5 and screenings. These two grades are giving sales managers some worry. This is particularly true of the central and northern Illinois group as well as of Indiana. Prices continue to remain on a level with established maximums. In some instances, it has been noticed that the producer was compelled to give the jobber 10 and 15c. per ton margin in order to move screenings and No. 5. This margin was not reflected in any reduction to the ultimate user, the only difference being that the Government pit mouth price was paid to the jobber instead of to the operator. Such sales were limited and had little effect on general market conditions.

The railroads are not buying in excess of their immediate needs, and the movement of prepared coal to the householder continues to be gratifying. Mines in Franklin, Saline, Williamson, Perry, Jackson and many other Illinois counties, as well as a large number of Indiana operations, have sufficient orders ahead for size coal to keep them going for some time to come. Retail dealers everywhere are unable to accumulate any storage stock and are able to unload from the car and haul direct to the customers' basement all the coal they can get.

CHICAGO

Conditions indicate some improvement. Screenings troublesome in some cases.

In many respects the coal market shows some improvement over conditions 30 days ago. The unusual demand makes all efforts to supply size-coal orders seem insignificant. The buyers seem willing to absorb everything in sight and indicate their willingness to place orders for months in advance. On the other hand, producing companies hesitate to load themselves with contracts for any grade other than fine coal, which grade they are compelled to make if they are able to supply the trade with lump, egg and nut. Operators contend they may be compelled to load railroad mine-run in order to protect their operation against an accumulation of no-billed cars of fine coal, unless there is a heavier buying of the latter grade. Although a slightly better average can be maintained by separating and selling at Government prices, no operator is willing to accept large orders for size coal unless he has fine coal contracts enough to take all his screenings.

The movement of anthracite showed some improvement during the past week but is still short of expectations.

Quotations in the Chicago market are as follows, per net ton f. o. b. cars at mines:

	Williamson and Franklin County	Saline and Harrisburg	Fulton and Peoria	Springfield	Cartersville	Grundy, La. Salle, Bureau and Will
Steam lump.....	\$2.65@2.80	\$2.65@2.80	\$3.05@3.20	\$2.65@2.80	\$2.65@2.80	\$3.35@3.50
Domestic lump.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Egg or furnace.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Small egg or nut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Stove.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Chestnut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Pea.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Washed egg.....	2.85@3.00	.....	.....	.....	2.85@3.00	3.35@3.50
Washed stove.....	2.85@3.00	.....	.....	.....	2.85@3.00	3.35@3.50
Washed nut.....	2.85@3.00	.....	.....	.....	2.85@3.00	3.35@3.50
Mine-run.....	2.45@2.60	2.45@2.60	2.85@3.00	2.45@2.60	2.45@2.60	3.10@3.25
Screenings, over 1 in.....	2.20@2.35	2.20@2.35	2.45@2.60	2.20@2.35	2.20@2.35	2.85@3.00
Washed slack.....	2.15@2.30	2.15@2.30	2.50@2.65	2.50@2.65	2.15@2.30	2.85@3.00

	Clinton and Sullivan	Knox and Greene	Eastern Kentucky
Domestic lump.....	\$2.65@2.80	\$2.65@2.80	3.10@3.25
Steam lump.....	2.65@2.80	2.65@2.80	3.10@3.25
Egg.....	2.65@2.80	2.65@2.80	3.10@3.25
Small egg or nut.....	2.65@3.00	2.65@2.80	3.10@3.25
Mine-run.....	2.40@2.55	2.40@2.55	2.85@3.00
Screenings.....	2.15@2.30	2.15@2.30	2.60@2.75

MILWAUKEE

Federal agents investigating the cost of handling coal over Milwaukee docks. Dealers holding back deliveries of hard coal until a price schedule is fixed. Receipts by Lake slow and not up to last year's record.

Six special agents of the Federal fuel administration office are in Milwaukee studying the cost of handling coal over the docks. Their findings will determine the price of coal to Milwaukee consumers. No attention will be given to the cost of transferring coal from cars.

State Fuel Administrator Fitzgerald admits that dealers are disinclined to make deliveries of hard coal until prices are fixed by the Government, but he urges consumers to place their orders promptly nevertheless, as deliveries will be pushed as soon as a scale of prices is promulgated. He also enjoins users of soft coal to put in supplies before the season of car shortage begins and to keep a 60-day stock on hand. He reports that Illinois producers are so swamped with orders that no deliveries are promised until six weeks after receipt of orders.

Coal cargoes are slow in arriving, and the record thus far is considerably behind that of last year, up to this time. Since last week's report 13 cargoes have been received at Milwaukee, amounting in all to 87,376 tons, of which 11,370 tons were anthracite. Cargo receipts up to and including May 20 aggregate 303,359 tons, of which 58,972 tons were anthracite.

The city of Eau Claire has abandoned its plan to establish a municipal fuel plant until after the war, because an issue of bonds to the amount of \$10,000 would be necessary to carry out the project.

ST. LOUIS

A somewhat strenuous market on high-grade coals. A heavy demand with no supply to meet it. Standard market easier. Car supply short on many roads, and transportation unusually slow. No steam demand and railroad buying light.

There continues to be a demand for Cartersville district coal that cannot be met, and operators are having orders forced on them that at the present time means some time in July before they will be shipped. A determined effort is being made by the

Fuel Administration and dealers to prevail upon the public to buy the coals that are most available, but the demand for Cartersville continues in spite of these efforts.

In the Cartersville field cars are short and nearly all mines are showing a decreased tonnage on account of labor shortage. The railroads are falling down miserably in a general way on transportation. The Iron Mountain and the Illinois Central are especially bad, and in the St. Louis terminals conditions are beyond description.

Embargoes are on daily to certain parts of the city and surrounding territory on account of the congested manner in which coal and other freight is being handled in the terminals. The Fuel Administrator's office has been obliged several times in the past week to order embargoes against coal released.

Coal yards are without coal for as long as three or four days, and then have enough coal put in on one switch to last for almost a week. In the Duquoin field conditions are somewhat similar to those in the Cartersville field.

Mt. Olive district presents normal conditions at this time. The production, which is being pushed to the utmost, is just about equal to the demand, except on steam coal, which is dragging here, as everywhere

The circular here is, per net ton f.o.b. mines:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump.....	\$2.65@3.00	\$2.65@2.80	\$2.65@2.80
3x6-in. egg.....	2.65@3.00	2.65@2.80	2.65@2.80
2x3-in. nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 2 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 3 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 4 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 5 nut.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. scrags.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. lump.....	.....	2.50@2.65	2.25@2.40
3-in. lump.....	.....	2.35@2.50	2.25@2.40
Steam egg.....	2.45@2.60	2.45@2.60	2.45@2.60
Mine run.....	.....	.....	.....

Washed:	Williamson & Franklin Co.	Standard
No. 1.....	2.65@3.00	2.65@3.00
No. 2.....	2.65@3.00	2.65@3.00
No. 3.....	2.65@3.00	2.65@3.00
No. 4.....	2.65@3.00	2.65@3.00
No. 5.....	2.15@2.30	2.15@2.30

Williamson & Franklin Co. rate is 87½c.; other fields, 72½c.

General Statistics

BALTIMORE & OHIO

The following is a statement of coal and coke tonnage moved over the Baltimore & Ohio system and affiliated lines during the month of February, 1918, as compared with the corresponding month of the previous year:

	1918 Tons	1917 Tons
Coal.....	3,225,974	2,471,359
Coke.....	225,258	203,766
Total.....	3,451,232	2,675,125

APRIL SHIPMENTS OF ANTHRACITE

The shipments of anthracite in April, 1918, as reported to the Anthracite Bureau of Information, amounted to 6,368,372 tons, an increase of 776,074 tons, or almost 14 per cent. over those of the corresponding month of last year. Despite several record-breaking months during the coal year ending Mar. 31, and the remarkable showing for the entire year, the April, 1918, shipments are close to the high monthly average maintained during the year. The shipments by carrier companies in April 1917 and 1918, were as follows:

	April, 1918	April, 1917
P. & R. Ry.....	1,233,512	1,004,028
L. V. R.R.....	1,175,027	988,873
C. R. R. of N. J.....	649,621	626,501
D. L. & W. R.R.....	1,008,018	893,458
D. & H. Co.....	771,553	639,495
Penna. R.R.....	448,374	433,314
Erie R.R.....	695,186	664,609
N. Y. O. & W. Ry.....	185,650	145,179
L. & N. E. R.R.....	322,167	298,220
Total.....	6,489,108	5,693,677
Deduction.....	120,735*	101,378*
Total.....	6,368,373	5,592,299

* Deduction: Tonnage reported by both C. R. R. of N. J. and L. & N. E. R.R.

CHESAPEAKE & OHIO

Following is a comparative statement of the coal and coke traffic from the New River, Kanawha and Kentucky districts for the month of March, 1918, and the three months ending Mar. 31, 1918:

		COAL		COKE	
To		March 1918	March 1917	March 1918	March 1917
		1918	1917	1918	1917
Tidewater (bituminous).....		528,670	599,147	1,344,756	1,625,050
East (bituminous).....		275,247	248,930	955,950	773,325
West (bituminous).....		1,365,126	1,079,451	3,347,498	3,121,346
Company's fuel (bituminous).....		209,216	260,701	579,073	654,869
From connections (bituminous).....		135,432	171,150	347,715	454,975
Total.....		2,513,691	2,359,379	6,574,992	6,629,565
Anthracite.....		784	1,590	7,046	2,934
Total coal movement.....		2,514,475	2,360,969	6,582,038	6,632,499
To		March 1918	March 1917	March 1918	March 1917
		1918	1917	1918	1917
Tidewater.....		22,663	10,150	68,325	37,773
East.....		15,769	25,808	52,212	73,457
West.....		.....	.....	.....	.....
Total.....		38,432	35,958	120,537	111,230
From connections.....		7,668	7,499	15,903	19,884
Total coke movement.....		46,100	43,457	136,440	131,114